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In the Northrop Flying Wing, these qualities are provided *electronically*—by a system that makes the wingtip rudders perform directional and stabilizing functions.

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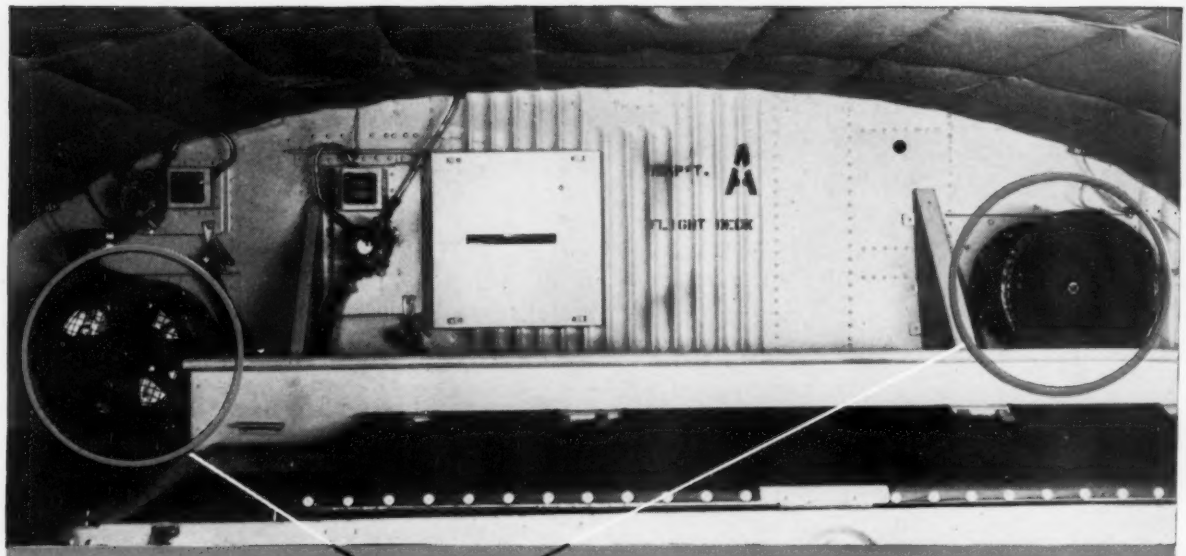

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ELIMINATE DANGEROUS FUMES

The Douglas C-124A Globemaster II, designed and manufactured by the Douglas Aircraft Company, Inc., Long Beach, California, is designed to permit trucks to be driven directly into the cargo department for loading or unloading. Exhaust gases from gasoline or Diesel-driven trucks would present a hazard to the loading crew. Two Joy AXIVANE Aircraft Fans are therefore installed in the forward cargo-compartment bulkhead. These introduce a large volume of outside air into the cabin, during loading operations, to prevent the accumulation of explosive or toxic vapors. When the plane is transporting troops, these fans provide ventilating air prior to take-off.

Each of these highly-efficient .6 H.P. blowers produces 1280 C.F.M. at 2.0" static pressure, yet weighs only 15.5 pounds and is only 9" in diameter. Distinctive advantages found in all Joy Aircraft Fans are compact design, shock-resistant strength, minimum operating noise, and the most favorable air volume-to-weight and electric-to-air power ratios.

W&D A3441

● Joy designs and builds each fan to the exact requirements for which it is intended. Each fan, therefore, is custom-engineered for highest efficiency. For many purposes stock fans can be supplied from the extensive line already designed. Both single and two-stage units available. Optional features include straight or flared inlets, beaded or flanged connections, radio noise-filters, anodization, and cooled motors where required.

★ ★ ★ ★ ★

Here are some of the many uses for Joy AXIVANE Aircraft Fans: Windshield de-frosting, windshield or wing de-icing, cabin heating, cabin ventilating, cockpit heating, cooling radio and electronic equipment, cooling voltage regulators, oil cooling, gear-box cooling, instrument cooling, air recirculation, and high-altitude pressurizer boosting.

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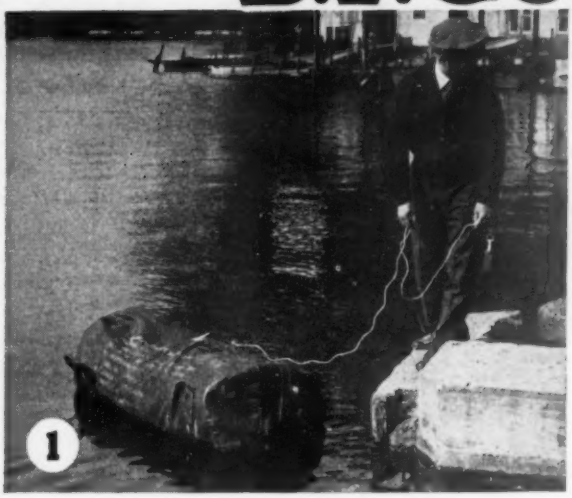

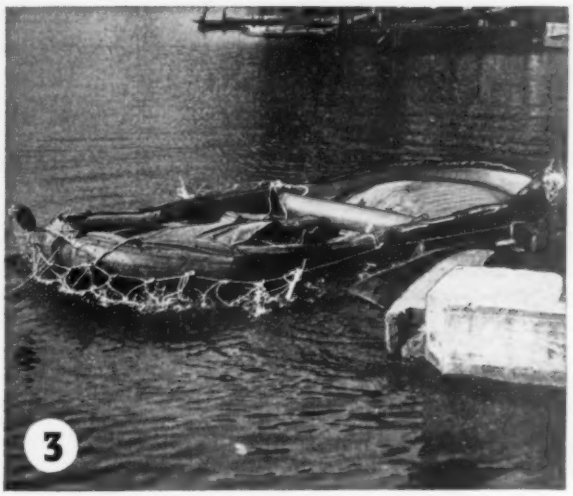

60-inch bag holds 12-man boat, unzips itself in seconds

THE COAST GUARD and B. F. Goodrich have solved a difficult rubber raft problem. An inflatable boat that accommodates 25 men—12 in the boat, 13 alongside—can be rolled into a compact bundle, only 60 inches long.

Trouble was that the boats were being splashed with sea water and oil, and a storage case that could be opened instantly in emergencies wouldn't seal out these elements. The builders of the case had heard of the B. F. Goodrich pressure sealing zipper, thought it might be the answer. It was, so far as sealing the case was concerned.

In addition, B. F. Goodrich engineers have developed a seal for the end of the zipper and a lock that can be opened instantly. A half turn and a yank, and not only does the zipper unlock, but a carbon dioxide bottle inside the case is released, providing the pressure that zips open the case.

The storage case problem has been solved with a unit that assures dependability after long storage. Provides a water-tight seal in the stormiest seas. And speeds up the launching and inflating job. In tests, the whole launching operation can be handled by one man.

If you have a problem that rubber or flexible materials might solve, B. F. Goodrich engineers may already have the answer. Check with *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

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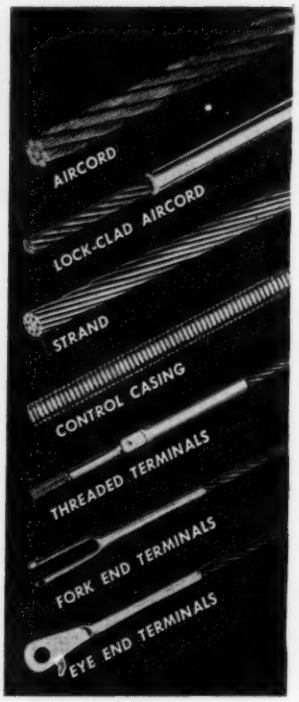

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ROEBLING

Aviation Week

ABP Member ABC

Volume 54 **February 12, 1951** **Number 7**

Headline News

Helicopters to Star in Show, Study... 13
Is USAF Troop Support Adequate?.. 14
Airlines Pinch-Hit for Railroads..... 15
Our Expanding Industry..... 16
NAA Annual Report..... 17
AF Studies Convertaplane Design.... 17

Financial

EAL Strengthened by PAA Deal..... 18

Production

$14 Million for Lockheed Planes..... 21

Aeronautical Engineering

Safety vs. Performance..... 24
More Briefs From IAS Sessions..... 30
France Starts Jet Transport Study.... 33

Aviation Sales & Service

Specs for an Executive Plane..... 35

Equipment

Huge Saving in Inventory Control.... 36

Air Transport

Avionics Navigation Work Spurred... 40
NWA Reorganizes Operations Setup.. 41

Editorials

Is Patriotism for Kids?..... 54
A Public Servant First..... 54
Another Investigation 54
Why Did Truman Say It?..... 54

Departments

News Digest 7
Sidelights 8
Picture Page 9
Who's Where 11
Industry Observer 11
Washington Roundup 12
USAF Awards 22
Production Briefing 22
New Aviation Products..... 39
Also on the Market..... 39
Shortlines 44
Aviation Calendar 46
Strictly Personal 52
What's New 52

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- Cruising speed boosted to 175 mph
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And so on—through innumerable refinements! The results give you higher, more efficient performance levels in all important categories. The new all-over paint design is now standard. And inside the roomy four-place cabin you'll find new color styling. Front seats with more "ease" built in. Two-position rear seat with head rests. Increased ventilation. Choice of smart upholstery.

There's a new Beechcraft metal propeller, and Lear VHF radio receiver, transmitter, and low frequency receiver, too. Safety and ruggedness? That's an *old* story to this sturdy plane! See your Beechcraft distributor for *all* the facts on this great, new Model C35. Or write on your company letterhead to Beech Aircraft Corporation, Wichita, Kansas, U.S.A. Scores of improvements, plus the Bonanza's famous qualities tested by more than 2,600 now in service, make it *the* buy for '51!

Beechcraft

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...and the word for TEXACO is HELPFUL

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J. B. CARL (left), President of Dixie Air, Inc., is congratulated on his operation's safety record—one of the finest in the South. No plane has ever been lost, no student ever injured. Close supervision and preventive maintenance are important factors in establishing this enviable reputation.

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FOR THE AVIATION INDUSTRY

TUNE IN . . . TEXACO presents MILTON BERLE on television every Tuesday night. METROPOLITAN OPERA radio broadcasts every Saturday afternoon.

NEWS DIGEST

DOMESTIC

Joseph Adams last week was sworn in as a member of CAB for a term expiring Dec. 31, 1956. Former director of aeronautics for Washington State, he is a lawyer, colonel in the Marine reserve and has been a flyer for more than 20 years. He succeeds Russell B. Adams, recently named to the State Dept.

Contract for operation of the basic pilot training school for the Air Force at Columbus, Miss., has been awarded to California Eastern Airways. Classes beginning Apr. 4 will be attended by 134 cadets. Graham Aviation Co., Butler, Pa., recently awarded the contract for operation of the Greenville, Miss., school, will start pre-flight instruction Mar. 5.

Seven guided missile manufacturers have been asked to train selected USAF officers in the firing, testing and operational handling of rocket weapons. Training program will cover one year and is open only to regular USAF officers ranking between 1st Lt. and Major, and under 37 years old. Masters degrees in electrical, mechanical or aeronautical engineering are prerequisites.

New MATS vice commander will be Rear Adm. Hugh R. Goodwin, this week succeeding Rear Adm. John P. Whitney who has been ordered to sea in a routine change of duty.

Lawrence E. Therkelsen, official timer for many record flights, and veteran racing official, died in Los Angeles of a heart attack. He was 68.

Albert J. Hayes, president of the International Association of Machinists, has been named as special assistant on manpower problems by Mrs. Anna M. Rosenberg, Assistant Secretary of Defense for Manpower and Personnel. He will continue to serve as president of IAM.

TWA has filed suit in San Francisco District Court to enjoin the city's public utilities commission from collecting additional charges under recently imposed new airport rates, other than those contained in the airline's 20-year lease signed in 1942.

General Electric Co. has announced that its expanded jet engine manufacturing facilities at Lockland, O., will employ more than 10,000, rather than the 7000 previously estimated.

National Airlines has ordered six Douglas DC-6Bs at a cost of $7,500,000 for delivery starting in mid-1952. National plans to seat 66 passengers in the DC-6B, compared with 58 in the DC-6.

FINANCIAL

Consolidated Vultee Aircraft Corp. declared quarterly dividend of 35 cents a share on its common, payable Feb. 27 to holders of record Feb. 16.

Air Associates, Inc., reports profit of $26,134, after taxes, for the quarter ending Dec. 31, on sales of $1,985,510. For the corresponding period of a year ago, profit after taxes was $1993 on sales of $1,420,572.

Delta Air Lines reports net profits after taxes of $1,146,550 for calendar year 1950, compared with $450,967 in 1949.

American Airlines declared dividend of 87.5 cents per share on the $3.50 cumulative convertible preferred stock, payable Mar. 1, to holders of record Feb. 15.

Beech Aircraft Corp. declared dividend of 20 cents per share payable Feb. 13 to holders of record Feb. 1.

Lockheed Aircraft Corp. declared a 50-cent dividend on its capital stock, payable Mar. 14 to holders of record Feb. 23.

INTERNATIONAL

Air France crash of a DC-4 in French West Africa resulted in the presumed death of all 23 passengers and crew of six aboard.

Icelandic Airlines DC-3 with 17 persons aboard was missing at sea off the coast near Reykjavik. Searchers spotted wreckage believed to be of the plane and presumed all aboard were dead.

Canadian defense orders for the first two weeks in January totaled $5,316,562, of which $536,533 were for aviation equipment. Largest contractors: Aircraft Appliances and Equipment, Toronto; Aviation Electric Ltd., Montreal; and MacDonald Bros. Aircraft, Winninpeg.

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Here it is. One of the most compact aircraft actuators meeting all military requirements—the ROTORette, adopted for application on the F-84E, F-84F and F-94C. It is ideally suited for valve or damper operation. Compactness and light weight (little more than one pound) make its use mandatory where space or balance is critical.

Limit switches are load sensitive and adjustable for any value up to as much as 50 pound-inches. Motion between travel limits is controlled by *externally adjustable* positive stops, which cause a reaction on the load limit switches.

Operating on 26 volts D.C., the ROTORette is available in two models, one of which can incorporate either a position-indicating potentiometer or an intermediate position switch. Both models are qualified for compliance to Specifications AN-M-40 (Motor and Brake, including Filter), USAF-41065 (Environmental for complete actuator), and USAF-41251 (General Electro-Mechanical Actuator Specification).

Write for Bulletin 118

AIRBORNE

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SIDELIGHTS

People

John C. Leslie, vp of Pan American, writes he is making "wonderful progress" in his bout with polio. He attended the PAA board meeting Jan. 9 and has been going to his office once a week since . . . **Arthur W. D. Harris,** ex-Aviation Maintenance magazine, is named vice president of American Gas Journal in New York City . . . **J. Kirk Baldwin,** ex-CAA and now in Denver, is sending postcards to friends urging nomination of Eddie Rickenbacker as the coalition Democratic-Republican candidate for President . . . Captain Eddie recently swore his son in as a USAF aviation cadet.

From Round-About

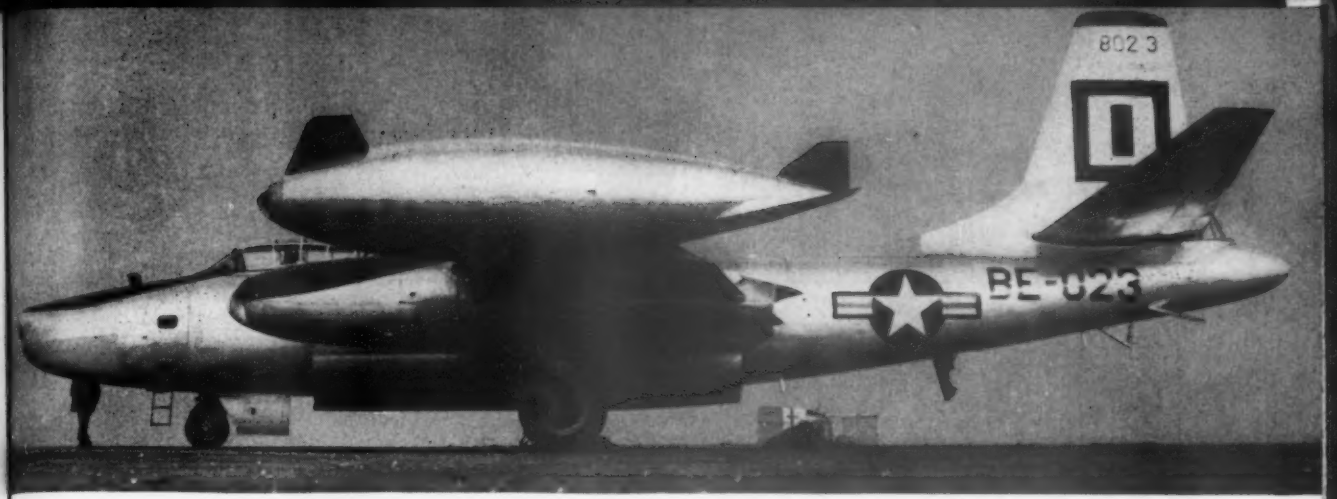
Oklahoma Aviation Commission moves to Hangar 3, Oklahoma City Muny Airport . . . The 78-acre **Woodbridge,** N. J., airport, pioneer sports field, will become a housing site . . . **CAA** wants 100 men for technical aviation jobs in Alaska. . . . **Chosen instrument** is still an issue as far as Sen. Pat McCarran is concerned; he's introduced a bill setting up a consolidated airline to operate all international routes . . . Watch for more pressure to eliminate **small cities** from trunk line routes because of the Ernst & Ernst report to Senate Interstate & Foreign Commerce Committee . . . **Gen Omar Bradley,** chairman, Joint Chiefs of Staff, is still taking a whipping from congressmen for failing to battle against former Defense Secretary Johnson's slashback in Naval aviation.

New Craft

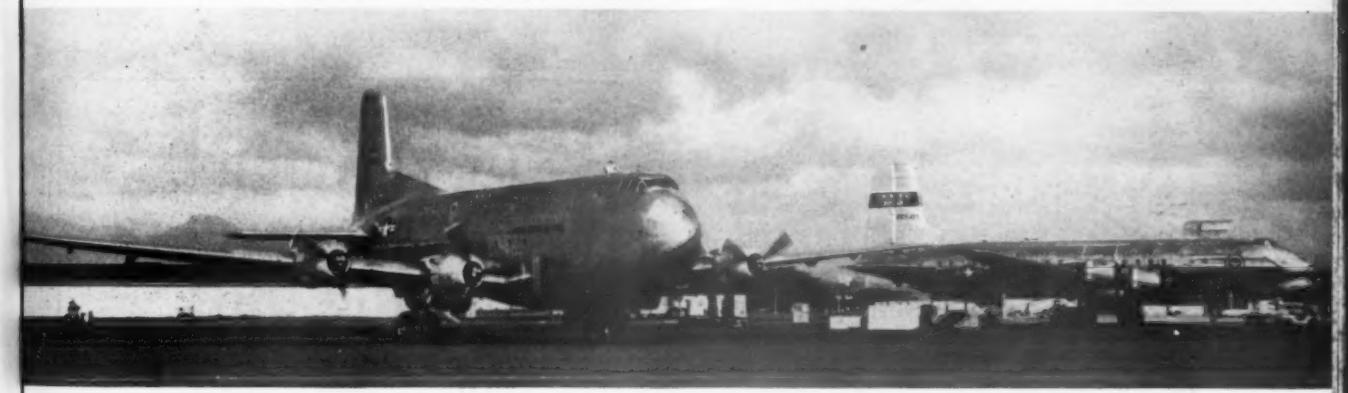
That new experimental agricultural **spray plane** of Fred Weick's, from Texas A&M College, will be shown at 3rd Annual National Agricultural Aviation Conference at Memphis Feb. 19-20 . . . A new **homemade copter** built and flown at Pontiac, Mich., recently, was engineered by five former employes of Aeronautical Products, Inc., a Detroit firm which produced one of the first postwar copters. The new ARI-1 (Aviation Research, Inc.) has a 125-hp. Lycoming engine, costs only $25,000 for development, and builders contend that with volume production unit cost might shrink to the $5000-$7000 range.

Industry

Aeronautical Standards Group of the Munitions Board is changing designation of Army-Navy-Air Force standards from AN to MIL in a gradual program. Later, JAN (Joint Army-Navy) standards, which are principally for electronics, may also be designated MIL . . . **Convair** has plenty of optimism for more Convair-Liner sales. Officials think the off-the-shelf purchase by American of the last four Liners signaled the trend to twin-engine ships. Part of airlines' interest is traced to threat that four-engined transports might be taken by military in a war; also, possibilities look good for turboprop conversions in short and medium hauls, Convair believes.



VISITING BRITAIN—One of four North American RB-45C-1s to fly to England for a brief visit is seen in profile at Manston. Note large (1200-gal.) multi-finned tip tank. The planes have flight refueling gear in the nose. They were accompanied by four KB-29 tankers.

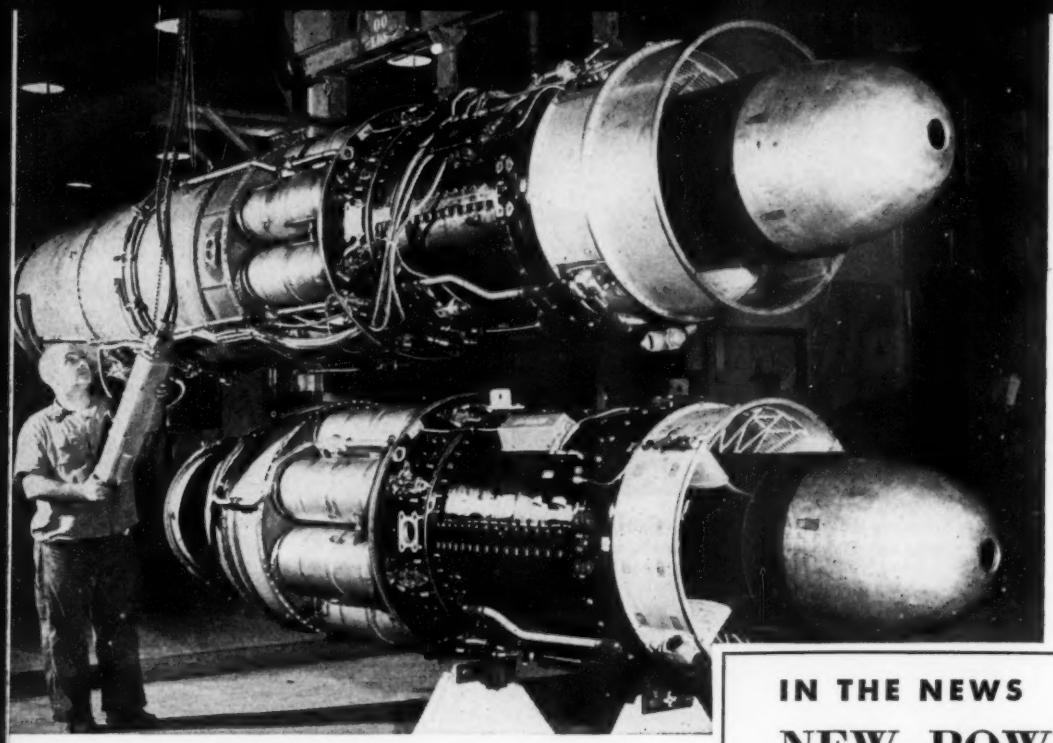


VISITING HAWAII—This photo, taken during visit of Douglas C-124A Globemaster 2 to Hickam AFB, affords a good comparison with the Douglas C-74 Globemaster, its slimmer predecessor. The Globemaster 2 made the flight from Travis AFB, Calif., in ten hours.

Military Aviation Picture Highlights

T-28 TRIO—A formation of North American T-28 trainers from Vance AFB, Okla., practices close flying. Vance is the first base to replace the T-6 completely with T-28s.

SKYRAIDER NEST—Final assembly of AD at Douglas-El Segundo plant.



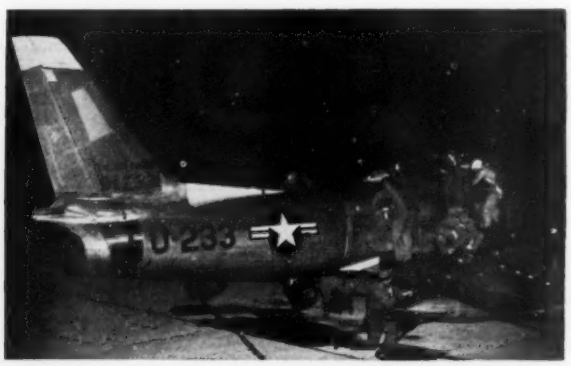
J47-17 reheat engine (upper), one of new engines now in production at G-E's Lynn, Mass. plant, features integrated electronic fuel and jet nozzle system for completely automatic control of engine and afterburner. New fuel system is designed for operation at 50,000 feet; opposite polarity ignition allows starts at that altitude.

IN THE NEWS

NEW POWER
NEW RESEARCH
NEW RECORD

Designed to suit your specific needs, turbojets, turboprops and turbosuperchargers are available at General Electric. This complete line of aircraft gas turbines is backed by forty-five years of experience. Specialists in every phase of aircraft gas turbine work assure you of quality and dependability. For aircraft powerplants that are constantly being improved, call your General Electric aviation specialist or write Apparatus Department, General Electric Company, Schenectady 5, New York.

Water-cooled periscope lets G-E engineers look directly into hot exhaust gases in jet tail pipes. Study of these burning gases is invaluable in the improvement of aircraft gas turbines. Research tools such as this are constantly being developed at G-E to give you better power.



World endurance record was set at Selfridge AFB by this North American F-86 powered by G-E J47. Plane landed every two hours for refueling but was operated continuously for 23½ hours. Civilian on wing is representative from widespread G-E service organization.

AIRCRAFT GAS TURBINES

GENERAL ELECTRIC

210-21

WHO'S WHERE

In the Front Office

C. A. Barker, Jr., vice president- treasurer of Lockheed Aircraft, has assumed additional duties as president of Airquipment and Aerol, as well as chairman of the board of the subsidiaries. **D. J. Haughton**, former president has become assistant general manager at Lockheed's recently acquired Marietta, Ga., installation. New vice president-general manager of Airquipment and Aerol is **Ralph Osborn**, formerly sales and advertising manager.

E. B. Newill, general manager of the Allison division, General Motors, has taken on personal responsibility for the aircraft engine operations of the division, a move in line with defense production expansion. Non-aviation responsibilities have been given, subject to Newill's final approval, to assistant general manager **Robert M. Critchfield. W. G. Guthrie**, director of general manufacturing, and **Roger Fleming**, public relations director, have become part of a general staff, serving all activities for the general manager and his assistant. Key aircraft engine personnel such as **R. M. Hazen**, director of engineering; **R. C. Golt**, sales and contracts manager; and **J. C. Cunningham**, mfg. manager, continue in these posts.

What They're Doing

Burton E. English, public relations counsel for Aircraft Industries Assn., has left for Japan to aid in setting up a news censorship system for the Far East Air Force. English was connected with the Air Force over a year ago as chief of security review.

C. L. (Chuck) Lowen, who helped pioneer the program of the Airport Operators Council and has been chairman of AOC's national security liaison committee for the past year, has resigned as Denver's director of aviation to give full attention to his personal business interests.

Changes

E. M. Lester has been named assistant general manager of Fairchild Engine division and **Alfred T. Gregory** has become head of the engineering division. . . . **Philip P. Miller**, formerly assistant to labor relations expert **Cyrus S. Ching**, has been appointed manager of labor relations for Republic Aviation Corp.

Jack T. Gray has been named as manufacturing manager at Lockheed's Marietta, Ga., plant, and **Robert W. Middlewood** chief engineer. **Reginald Kearton** has been made master schedule manager and **S. H. Neffler** is the works manager. Other appointees are: **Morgan Chase**, purchasing agent; **L. A. Mitchell**, industrial relations manager; **Ben Haverstick**, engineering planning schedule manager; **A. D. Brown**, project engineer; **G. P. Thorn**, service engineering division manager; and **F. A. Whattley**, chief manufacturing engineer.

Henry G. Tarter has been named general manager of Bendix Products' Hamilton division, with **W. A. Gebhardt**, succeeding him as assistant manager of fuel feed engineering at the South Bend plant.

INDUSTRY OBSERVER

►Both the North American F-93A penetration fighter prototypes are being turned over by the USAF to the NACA Flight Test Laboratory at Edwards AFB, Muroc, Calif., for high-speed flight research, indicating that this model, despite its excellent performance, is not going into production. The F-93, a scaled-up version of the North American F-86, is powered with a Pratt and Whitney J-48 engine, rated at 6250 lb. thrust dry and close to 9000 lb. with afterburner. The transfer will give NACA a chance to get some firsthand flight data on some of its late ideas about flush air intakes, which are incorporated in the F-93 design.

►New USAF air-droppable metal troop container is being developed by Stanley Aviation Corp., Buffalo, with first experimental model expected to be ready for AMC tests in three to four months. Container is lowered by two 100-ft.-diameter chutes. It will carry 12 fully equipped ground troops or 6000 lb. of cargo. Four air bags under the floor are inflated when container is released from plane, and cushion the landing shock. Container is designed for use with Fairchild C-119 combat transport. Dimensions are 8 by 8 by 5 ft. 10 in.

►Regardless of whether Fairchild or Kaiser-Frazer makes the C-119C Packets, they will all be called Fairchild Packets, the USAF has advised both companies.

►The Fairchild C-119C Packets on order for the Marines will probably be powered by Wright R-3350 compound engines built under license by Hudson Motor Car Co. under Navy sponsorship.

►Doman Helicopters has transferred the CW-40 rescue helicopter, built by Doman for the USAF helicopter rescue competition, to the Curtiss-Wright organization following the completion of flight tests contracted for. Now Doman is back on its own interrupted project of developing seven-place Pelican helicopter of different design. The rescue competition was won by the Piasecki H-21.

►Propeller trouble of the Allison Turboliner on its first test hop at San Diego was traced to a relatively minor ailment—improper balancing of the blades. Discovery followed an elaborate trouble-shooting overhaul of the two Allison T-38 turboprop engines and the Aeroproducts propellers. Plane is expected to fly to Indianapolis, as soon as it makes a few local shakedown flights at San Diego.

►A group of 10 Fairchild technical and production experts headed by Fairchild Vice President Paul J. Frizzell has paid its first visit to Kaiser-Frazer's Willow Run plant, starting to put into operation the assistance agreement between the two companies for building the C-119C Packets. Persons present said that the meeting was marked by amicability and indications that both companies were ready to "bury the hatchet and get the job done." First Willow Run-built Packet, assembled from parts supplied by Fairchild as part of the production training program, is expected to fly this fall.

►Scandinavian Airlines System has put its first Swedish-built twin-engine Scandia airliner into service on the Oslo-Gothenburg-Copenhagen run, and has taken delivery on two more Scandias. Deliveries of three more Scandias to SAS this spring will complete the schedule of six planes ordered.

►Guided missiles are now being produced and tested at Valcartier, near Quebec City, Canada, the Canadian Defense Research Board has disclosed. A new Canadian National Aeronautical Research Establishment is being opened at Uplands Airport, Ottawa. Details of the types and performance of the missiles have not been announced.

►First of Avro Canada's ten pre-production CF-100 twin-jet fighters fitted with Avro Canada-built Orenda jet engines will soon be completed and ready for flight. First two experimental CF-100 planes now flying, are powered with Rolls-Royce Avon turbojets.

Washington Roundup

20 Years of Militarism?

The President's recent declaration of a national "emergency" was really a bugle-call to announce a new long-time era of militarism; to condition the public to a long-haul burden of heavy defense spending—probably $60-billion-a-year for decades, with a level-off rate to around $10 billion a year for planes.

A target date of 1952 for war readiness is set. This, too, is primarily to add urgency to the takeoff of an indefinite period of armed preparedness. Actually, most military leaders don't anticipate a major war by 1952. Some do. But, there's no show of haste to meet the official deadline. The "emergency" program probably won't get underway before May or June. Washington's intent is orderly planning for the long range, not speed to meet a crisis.

Gen. Dwight Eisenhower's report to Congress clarified the situation: "We have to devise a scheme that we can support—over the next 20 years, 30 years, whatever may be the time necessary—as long as the threat, the announced threat of aggression, remains in the world."

Manpower Battle

Behind the scenes, Defense Mobilization Director Charles E. Wilson and Labor Secretary Maurice Tobin are tugging for control over manpower.

Wilson wants a top policy agency to coordinate civilian and military requirements set up at ODM, under Gen. Lucius Clay; Tobin wants it in his department. It's up for decision by the President.

With pro-labor Tobin, labor would get first consideration. He could be counted on to go slow in directing labor forces into essential industries, to throw his weight against plant conversions disrupting employment. With Wilson, production would come first.

NSRB Strip-Down

National Security Resources Board lost its long-range planning functions last week. The President set up a five-man Materials Policy Commission, under the chairmanship of Columbia Broadcasting System's president, William Paley, to take them over. NSRB has already been stripped of its short-range planning functions by Charles Wilson's Office of Defense Mobilization.

The only function left for NSRB's chairman, former Secretary for Air Stuart Symington, seems to be his statutory assignment: Advisor to the President.

Back to Life

• **Prototype development.** Secretary for Air Thomas Finletter wants USAF to go ahead on development of advanced cargo and jet planes adaptable to commercial use, senators report. He has Undersecretary John McCone's enthusiastic support, they state. Both were members of the President's 1948 Air Policy Commission that urged government financing of new commercial craft to assure U. S. leadership in commercial aviation and a reservoir of lift for military use in an emergency. They'll have to convert some military die-hards who are reluctant to divert know-how and materials from war plane development. USAF's Senior Officers Board recently ruled out a cargo plane designed for MATS operation from its research and development program.

• **CAA militarization.** Air Force is prodding Bureau of the Budget to clear legislation which would bring airways operations under its jurisdiction in a war emergency. It's been sleeping there for almost a year. CAA, under former Administrator Delos Rentzel, backed the plan. Outlook now is that CAA, under Administrator Donald Nyrop, with the approval of Commerce Department, will vigorously oppose it.

New Renegotiation Law

New law would set up an independent five-member, Presidentially appointed Renegotiation Board. Expect it on the books this week.

The measure explicitly subjects all Commerce Department contracts, for the first time, to renegotiation. This won't affect airport contracts, though. CAA merely makes grants to states and cities—which do the contract letting.

It generally expands renegotiation coverage to all contracts "related to the national defense." This means that contracts let by National Advisory Committee for Aeronautics, for the first time will also be subject to recapture for excess profits.

The Renegotiation Board, if it chooses, may let the services renegotiate their own contracts within the policies it lays down.

Congressional Committees

• **Rep. Carl Vinson's** House Armed Services Committee has been authorized to investigate the defense program, will probably be given $50,000 in the near future to start off with. It will go into war profiteering, a Vinson specialty. World War II hearings before the old Naval Affairs Committee which Vinson formerly headed led to enactment of the Renegotiation Law.

• **Sen. Lyndon Johnson's** War Preparedness Subcommittee plans "precautionary" checks at USAF training bases, mainly to assure that recruits aren't massed into centers with inadequate housing and training facilities. Informants report they are. USAF has already undertaken corrective steps at Lackland, Tex., and other bases.

• **Sen. Joseph O'Mahoney,** new chairman of the Senate Appropriations Subcommittee on the Armed Services, is a staunch proponent of sea and air power. He replaces Oklahoma's ex-Sen. Elmer Thomas who fought for Louis Johnson's cutback in USAF and Naval air power. Before World War II, O'Mahoney bucked the Administration and the War Department in a losing push to increase air strength. Again, in the pre-Korea period, he challenged the Administration and the Department of Defense by leading the Senate drive for a 70-group USAF.

• **Sen Harley Kilgore,** new chairman of the Appropriations Subcommittee on Post Office Department, will demand detailed facts and figures on mail pay to international air carriers—particularly Pan American. He's long been critical of alleged PAA and American Airlines pressure tactics.

AVIATION WEEK VOL. 54, NO. 7
FEBRUARY 12, 1951

Helicopters Will Star in Show and Study

April date selected for demonstrations on Mall in Capital.

By Alexander McSurely

Two major moves tending to consolidate startling gains in public acceptance made by the helicopter in the last year were started in Washington last week by the U. S. military services in cooperation with the helicopter industry, and by the Air Coordinating Committee.

The two unrelated but simultaneously launched programs are:

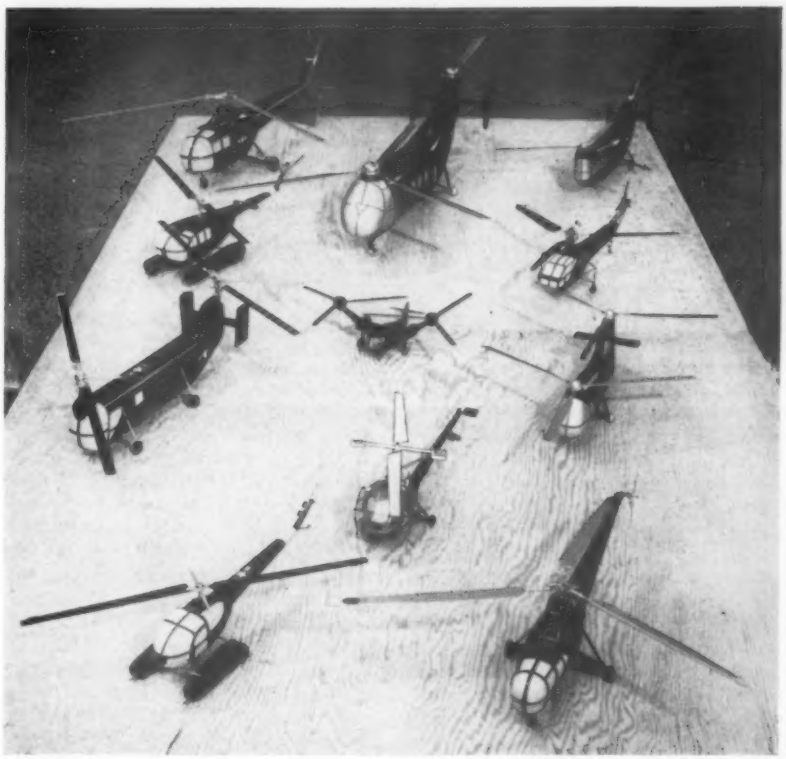
• **A spectacular aviation show** Apr. 28-29 in Washington, D. C., with flight and static demonstrations of more than 20 different types of helicopters.

• **A government helicopter study** to determine effects of current military helicopter developments on tomorrow's commercial helicopters, which will probably have a long-continued effect on helicopter progress after its completion.

The aviation show, planned to coincide with the conclusion of the annual meeting of the American Helicopter Society at the Hotel Washington, Apr. 26, 27 and 28, will give helicopter manufacturers, for the first time, a chance to put on a full-dress demonstration of the unique capabilities of the helicopters in commercial and military roles.

Cooperating in flight demonstrations will be USAF, Navy, Army, Marine Corps and Coast Guard copters and their crews, as well as commercial rotorcraft demonstrating agricultural crop spraying, mail deliveries, passenger services and other commercial uses. New York Police Department helicopters will present flight demonstrations of their rescue work.

▶ **On the Mall**—Peculiar flight characteristics of the helicopter—taking off and landing vertically without ground run—make it possible to conduct helicopter flight demonstrations on Washington's famous Mall between the Capitol and the Washington Monument. Several individual copter demonstrations have been held here, and it is planned to focus flight and static show activities here with additional exhibts in the nearby Smithsonian Institution and its National Air Museum. Brig. Gen. F. H. Lamson-Scribner, Marine Corps, has been named chairman of the services flight show committee, and Lt. Cmdr. William Bryson, Navy, chairman of the publicity committee.



COPTER DISPLAY in miniature in lobby of the Navy Building in Washington is a small sample of the show expected in April. These models of the Navy's copter fleet are (reading up): left row, Bell H-15 (AF designation) with floats; Bell XHSL-1 anti-submarine craft; Bell YH-13 (AF designation) on floats; Sikorsky XHJS; center row, Hiller HTE trainer; McDonnell XHJD-1 prototype (much larger than small scale model indicates); Piasecki HRP-2; right row, Sikorsky HO3S; Piasecki HUP; Sikorsky HNS-1 (oldest service helicopter purchased in quantity); and Piasecki HRP-1 prototype assault transport.

The show will demonstrate before Congress and the military and civil branches of government in Washington, the progress of the helicopter and its future potential in commerce as well as in war. But the unspectacular helicopter study can be an equally powerful force in affecting the future of the rotorcraft.

▶ **Copter Survey**—The study is being directed for the Air Coordinating Committee by R. K. Waldo, assistant to Fred Lee, Deputy CAA Administrator. It was proposed to ACC by the U. S. Post Office Department, which asked for a thorough analysis of the future potential of the helicopter. This should establish whether or not it merits continued federal government support and development, both military and civil.

Waldo has asked the cooperation of the U. S. helicopter manufacturers in providing answers to the survey questions which are now being prepared in detail. General outlines of the survey however, are already clear, and will include these detailed investigations:

• **Today's helicopter,** its technical and economic characteristics and uses.

• **Military helicopter** developments and activities and their effect on tomorrow's commercial helicopters as to airframes and powerplants.

• **Tomorrow's commercial copter,** its technical and economic characteristics and uses, as compared to competitive fixed-wing craft:.

• **Summary justifying support** of the

helicopter development through more widespread use by air carriers, and other means.

• **A supplementary study** on the future of the convertaplane, a proposed aircraft which would combine vertical flight characteristics of the helicopter with direct forward thrust to achieve level-flight characteristics of fixed-wing aircraft through mechanical changes.

Probable "stars" of the April flight show in Washington will be the leading military production models now flying.

Such big helicopters as the 10-place Sikorsky S-55, Piasecki HRP-2 and Bell YH-12, the seven-place Piasecki HUP, and smaller models such as Bell H-13 and H-15, Hiller H-23A and HTE, and Kaman HOK, HTK, and H-22 and Sikorsky H-5 and H-18 are expected to be among the aircraft shown.

A number of other experimental prototype helicopters, including possibly some small jet-powered machines, and commercial models of Sikorsky, Bell, Hiller and Kaman are also expected to figure in the two-day demonstration.

Is USAF Troop Support Adequate?

Congressional investigation may point the way toward Army taking over control of tactical aviation.

By Ben S. Lee

Steps to bring about a congressional investigation of the inadequacies of tactical air support provided by the USAF to the Army are being taken in Washington, AVIATION WEEK has learned.

Figuring importantly in the overall proposed inquiry is the specific question: Why has the Air Force failed to procure the Chase XC-123 assault transport, winner of a recent assault transport competition?

Natural channel for the investigation would be through the House Armed Services Committee. While some members of the committee favor such an inquiry, the final decision to project it will probably remain with its powerful chairman, Rep. Carl Vinson.

►**Fine Job, But**—While it is generally conceded that USAF has done a fine job in Korea despite obvious deficiencies in tactical air equipment available there, the deficiencies have pointed up the weakness in this phase of U. S. air power, a congressman said last week.

General Douglas MacArthur apparently shares this view, for according to reports of his talks with President Truman in the Pacific last fall, he expressed dissatisfaction with tactical air support. The President promised that it would be bolstered immediately. "I have not noted that the situation has altered materially as yet," the congressman said.

General Omar Bradley, Chairman of the Joint Chiefs of Staff, following a recent visit to the Far East, also issued a staff report expressing no little concern over the quality of aircraft assigned to Korean effort, tactically, and to the overall inefficiency of tactical air support techniques, a Defense Department source declared.

►**Army Purchasing Limit**—Several months ago, Army asked for removal of an Army-USAF agreement restricting Army to the purchase of fixed-wing aircraft weighing less than 2500 lb. and helicopters weighing less than 4000 lb. The problem is still under consideration. Weight limitations virtually freeze Army to procurement of aircraft intended only for liaison.

"This situation," a high-ranking Army officer stated to AVIATION WEEK, "would suffice, if Air Force cooperated with Army for its needs in heavier aircraft fields. Our needs in transport are totally ignored as are our concepts in fighter and fighter bombers in tactical support utilization.

"The Chase Aircraft Co.'s XC-123, for example," he said, "was built specifically to meet requirements of the Army in the medium transport field. It is what Army wants and what it needs to fight a war. After long, unnecessary delays, Air Force evaluated the plane with several others (Northrop C-125 and Fairchild C-82). The Chase plane won the evaluation virtually on every count, as we thought it would, but there is still no contract for its manufacture.

"If the present weight limitations were eased, we'd buy the C-123 ourselves," the spokesman said, "and it is my belief that a real scandal exists in the fact that Air Force hasn't contracted for the plane in quantity."

The entire problem of the application of air power to tactical support problems of Army has been under the eyes of Congress for some time. Late last year an investigation of tactical aviation was promised by House Armed Services Committee Chairman Carl Vinson. It was sidetracked when Air Force let it be known it "would do something."

►**Army Field Command**—There is a growing feeling in military quarters that tactical aviation should be placed under control of Army. From a practical point of view, top officials of both Army and Air Force claim it would be unwise to actually transfer "tactical" to Army. There is some consideration being given instead to correcting existing command relations between services.

This means that tactical air forces in support of armies would be placed under Army command instead of being offered for "cooperation whenever the over-all air situation permits."

Army planners do envision, however, establishment of an Army Air Logistics Support Group. Army would like to provide for its own internal needs much in the same manner as Navy's Fleet Air Logistics. It has no desire to infringe upon the strategic airlift mission of Military Air Transport Service, it was said.

Congressman Walter Norblad, a member of the House Armed Services Committee, is a firm adherent to the cause of Army in tactical air support. He told AVIATION WEEK that he believed that all tactical and transport aviation should be transferred from the Air Force to the Army. "I have urged my committee to conduct immediate hearings on the subject.

"Many in high command," said Norblad, "including General MacArthur and General Omar Bradley have recognized the need for coordination between air support and the ground troops.

"The Marine Corps, with its own aviation, has coordinated its Korean air and ground attack in an excellent manner and has been the leader in precise close support. On the other hand, when the Army needed bomber or fighter support for its troops, it was necessary to go through an involved chain of command from one service to the other with a resultant waste of time and without the coordination found in the one-command system of the Marines.

"During air ground combat operations, the air was under one command and the ground troops under another. It simply isn't logical.

"The Air Force should continue to command and develop long-range strategic bombing on distant targets, but all of the short-range bombers, fighters and transports should be returned to the jurisdiction of the U. S. Army," the congressman said.

"I do not mean to imply that I am against the present air development program—to the contrary I have urged for several years that it should be expanded—but I do feel that we will have a much more efficient and capable fighting machine if this transfer is made."

Norblad was a combat intelligence officer in the 8th Air Force during World War II. He is a member of the four-man Tactical Aviation Subcommittee of the Armed Services Committee.

First MDAP F-84Es En Route to Europe

First shipment of Republic F-84E Thunderjet fighters is en route from Republic's Farmingdale, L. I., plant to North Atlantic Treaty nations as part of the Mutual Defense Assistance Program, the Air Force has announced.

About 300 F-84E fighters are scheduled for delivery to European nations this year, with approximately 800 F-84s expected to be in French and Italian hands by end of 1952 (AVIATION WEEK Dec. 4, 1950).

Officer cadres of both governments have already toured U. S. aircraft manufacturing plants and are now enrolled in training courses at Chanute AFB, Ill., and other USAF technical training installations.

British Defense Minister Emanuel Shinwell recently confirmed an earlier AVIATION WEEK (Dec. 4) report that the Royal Air Force would be equipped with North American F-86 Sabre fighters immediately. The F-86 equipment for England, Shinwell declared, would be used to "tide over an 18-months gap" until latest British jets still on the secret list came into operation. AVIATION WEEK previously reported scheduling of 500 F-86s to the RAF.

The North American F-86, according to Pentagon sources is to be standardized for production in Western Europe as this nation's contribution to air defense of NATO nations. Tests and evaluation at Muroc AFB, Calif., of an Avro Orenda-powered version of the F-86 are nearing completion. On the basis of improved performance of the plane with the 6500-lb.-thrust Orenda, the Canadian-built engine will probably be used to power F-86s scheduled for export under MDAP. Canadair Ltd., now licensed to build the F-86E in Canada, currently uses the General Electric J-47 in its F-86s.

To meet MDAP commitments, Defense Minister Shinwell said, negotiations are under way in Washington for a three-way arrangement that will step up the flow of American raw materials and engines to Canadian plants and then as finished aircraft to Britain.

Other U. S. aircraft scheduled for delivery to MDAP, already confirmed by actual contract, are Lockheed T-33 two-place jet trainer-reconnaissance planes and quantities of North American T-6 trainers.

Negotiations are under way between Navy and Lockheed for a sizeable quantity of Neptune P2V patrol bombers for NATO members.

Under the Military Assistance Program for the NATO group, a Defense Department spokesman said, about 600 airplanes of various types have already been shipped abroad.

PASSENGERS milled around airline ticket counters at LaGuardia Field, and . . .

FREIGHT poured into air cargo terminals as airlines took over the railroads' jobs.

Airlines Pinch-Hit for Railroads

U. S. travelers began a mad rush to airline ticket counters last week when the nation's railroad workers paralyzed train movements by staying home. The full impact of the strike brought new loads to air carriers already struggling to take care of a backlog accumulated from previous flight cancelations caused by nationwide bad weather.

A roundup at presstime showed how the major carriers were doing:

• **American Airlines'** load factors systemwide read like this: Feb. 2, 72.8 percent; Feb. 3, 72.9 percent; Feb. 4, 80.3 percent; and Feb. 5, 75 percent.

The eastern region averaged load factors of about 93 percent, with the figure for Sunday, Feb. 4, on the New York-Boston run soaring to 99.6 percent. The situation on the latter run was such that at LaGuardia Field agents for the nonskeds reportedly were hawking one scheduled line's passenger standbys and offering flights to Boston at $30 per head. But only two passengers were said to have strayed from the scheduled fold. (Regular fare is $12.82, with tax.)

American ran 27 extra passenger sec-

tions and ten extra airfreight sections systemwide, the heaviest traffic being in the northeast.

• **Eastern Air Lines**' plane utilization was up to 12-13 hr. daily, with load factors from New York to Florida running higher than 90 percent. The carrier was operating only two DC-3 freighters, because the Navy took four DC-4s after the Korean outbreak, but cargo Speedpaks were being used to capacity.

• **Trans World Airlines** had 13 extra sections for mail, express, and freight flying Feb. 4 from New York to Pittsburgh, Chicago, St. Louis, and Kansas City—about twice the normal load. Generally equipment was available to handle the increased passenger lift.

• **United Air Lines** watched passenger loads for Feb. 2-5 rise 58 percent over the same four-day period in the previous week. Passengers who also had train reservations, a spokesman said, went through with their flights even when some rail service resumed.

Record-breaking volumes of incoming and outgoing **mail, freight** and express were recorded by UAL. Figures for Feb. 4, the peak day: Incoming mail up 142 percent, outgoing up 1726 percent; incoming express up 174 percent, outgoing up 1724 percent; incoming freight up 579 percent, outgoing up 886 percent.

• **Slick Airways** business doubled, with the freighter putting loads on a priority basis. Heaviest traffic was to and from the Coast, and all the carrier's 26 Curtiss C-46s were busy.

Plant production machinery was the biggest single category. One of the carrier's biggest accounts, the Buick, Oldsmobile, Pontiac divisions of General Motors, scheduled production to the amount of material that Slick could fly in.

Slick was handling 100,000 lb. a night for the automotive industry.

At LaGuardia, Port of New York Authority officials noted 40,023 passengers flown out over the big weekend, a 59-percent increase over the average for the past five weekends, with 1212 plane movements, up 16.3 percent over the corresponding previous period.

Scheduled airlines had run 131 extra sections over the Feb. 2-5 period, an increase of 300 percent over the average of five previous weekends.

Aero Commander Set For 1951 Deliveries

In spite of growing shortages of materials and accessories, Aero Design and Engineering Co., last week announced it now has on hand materials for production of its first 20 Model 520 Aero Commander executive twin-engine transports, and is taking civilian orders for deliveries beginning September and continuing through October of this year, flyaway Oklahoma City, at a $45,000 price.

Price quoted is for the model equipped with two Lycoming GO-045 geared engines rated at 260 hp. each, with Hartzell constant-speed full-feathering propellers, complete flight panel and basic radio including Lear VHF receiver, transmitter and automatic direction finder.

R. T. Amis, Jr., Aero president, said that the planes are now in production at the company's recently established factory at Tulakes Airport, Oklahoma City. Because of unsettled general price conditions, Amis said the quoted price would be subject to change without notice.

Commercial models of the plane will be flying before the company gets into military production. The five-to-seven-place transport is under consideration by both the Air Force and the Army, the company said, for use as a liaison-courier-ambulance litter and utility plane, and also as a flying staff car for command officers.

While no detailed data on the performance of the production Aero Commander with the geared Lycoming engines has yet been announced, an earlier design estimate (AVIATION WEEK July 11, 1949) predicted the following performance: 198-mph. top speed at sea level, 180-mph. sea level cruising speed; 196-mph. cruising speed at 10,000 ft., and 61-mph. stall speed with flaps. A lower-powered prototype with 190-hp. Lycoming has been certificated by CAA with a top speed of 181 mph. sea level, a cruising speed of 165 mph. at sea level, 179 mph. at 10,000 ft., and stalling speed of 56 mph. with flaps.

Our Expanding Industry . . .

Frigidaire division of General Motors Corp., Dayton, is converting from refrigerators to propellers, as it did in World War II. It will manufacture Aeroproducts props for use on the Fairchild C-119C. Approximately 2500 Frigidaire employes will be used in the propeller production, which will be in addition to the output of the same propellers by GM's Aeroproducts division. . .

Fairchild Engine & Airplane Corp. is buying 32 acres of land on Long Island "suitable for construction" of a 1-million sq. ft. plant. Nature of production at the new facility was not disclosed. . . Fairchild's Engine and Stratos divisions at Farmingdale, L. I., have gone on a 50-hr. work-week for shop personnel. . .

Kaiser-Frazer Corp. has been licensed by Wright Aeronautical to build the Cyclone 7-piston engine at the Detroit plant where Continental formerly built auto engines for K-F. . .

Boeing Airplane Co. engineering division project employes now are working a six-day, 48-hr. week. One-third of Boeing-Seattle's 23,000 employes are on a 48-hr. week. . .

Twin Coach Co. is looking for additional employes and space to fulfill $22-million worth of new military orders from Grumman and Piasecki. With a military backlog of $40 million, Twin Coach wants to add 1500 workers and double its present 300,000 sq. ft. of space at Buffalo. . .

Hughes Aircraft Co. has begun construction of a new electronics manufacturing plant near Tucson, Ariz. It is scheduled to be completed in six months and its employment rolls should number 1500 a year from now. Best best: The new plant is for production of missiles. . .

Rheem Mfg. Co. is returning to aircraft subcontract work, in which it was engaged during World War II, with the purchase of 50 acres at South Gate, Calif., for construction of a 200,000-sq. ft. plant. It has formed a new aircraft department to be headed by Laurance H. Cooper, recently vice-president and general manager of Pacific Airmotive Corp. . .

Menasco Mfg. Co. has expanded its work week to 53 hr. to meet stepped-up military demands for landing gear.

AF Base Expansion

Air Force has a green light from House Armed Services Committee for a $327-million expansion program at 13 training bases.

Expansions would be at USAF bases at:

Fort Snelling, Minn.; Camp Kohler, Sacramento, Calif.; Wichita; Biloxi, Miss.; Orlando, Fla.; Lackland, San Antonio; Sampson, Geneva, N. Y.; Amarillo, Tex.; Sheppard, Wichita Falls; Bryan, Tex.; Connally, Waco, Tex.; Randolph, San Antonio; San Marcos, Tex.

NAA Report

New orders up backlog by $160 million from fiscal '50 $311 million.

New aircraft and missiles contracts now being negotiated by North American Aviation, Inc., have a total value of approximately $160 million, over and above the $311-million backlog reported at the end of the company's 1950 fiscal year, Sept. 30, it was disclosed last week.

Further substantial orders, in addition to these two groups, are now being discussed, North American Board Chairman J. H. Kindleberger reported to stockholders in the company's annual report.

Most of the unfilled backlog as of Sept. 30, was for additional quantities of models now in production, or advanced versions of those models.

Net sales and other income of $143,268,418 and net income of $8,086,255 after taxes were reported for fiscal year 1950.

Income after taxes equals earnings of $2.35 per share of stock as compared to $2.12 per share from a net income after taxes of $7,306,409 for 1949 fiscal year.

Dividends of $1.25 a share were paid to stockholders in fiscal 1950, with a subsequent dividend of 75 cents a share paid Dec. 20, 1950 (in fiscal year 1951). Wages and salaries totaled $68 million or 53 percent of all cash expenditures during the fiscal year.

Approximately 98 percent of all 1950 North American sales were to U. S. Air Force and Navy.

It is not expected that final determination under renegotiation requirements will result in any substantial refunds although $84.2 million of the company's 1950 sales are subject to renegotiation limitations.

The report listed net working capital of $46.5 million as of Sept. 30, compared to $42.8 million at the beginning of the fiscal year. Cash balance was reported as $13.3 million, and gross capital expenditures as $1,067,592 against $912,856 depreciation.

Dollar increase in sales was paralleled by an increase in airframe production, which reached 7,945,000 lb. in fiscal 1950, approximately 1.5 million lb. more than the total for the preceding fiscal year.

Here was what North American produced:

• **F-86 jet fighters.** Over half of North American planes shipped in 1950 were F-86s. In the fourth quarter, production changeover from F-86A to the later F-86E model was made and the F-86A program was closed on schedule shortly after the end of the fiscal year.

• **T-28 trainers.** The T-28 production lines were filled in the spring of 1950 and had passed the scheduled production rate by Sept. 30. Production of the trainers is being transferred to the Downey North American Aviation plant.

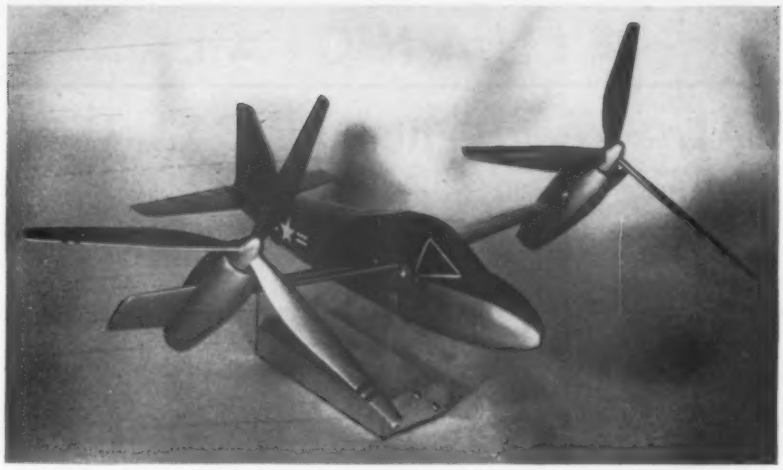
• **B-45 jet bombers.** All but two of the RB-45C photo-reconnaissance planes had been completed by Sept. 30 and all remaining B-45A and B-45C bombers were accepted.

• **AJ-1 atomic bomber.** Production of AJ-1s continued at the Downey plant.

Modification programs, including the re-manufacture of 330 T-6G trainers, are being transferred to the Long Beach plant, along with the "non current" spare parts program.

Ground tests of missile rocket motors are being made in the North American field test laboratory near Los Angeles, and work on the systems for missile operation is continuing.

North American has doubled its research personnel in atomic research, working with nuclear reactor technology.



CONVERTAPLANE model developed at Wayne University from basic idea of J. Oliver Black of Peninsular Products Corp. features wings and engines which can pivot from horizontal to vertical to permit change from level to up-and-down flight. This is an oft-proposed solution to meet convertaplane requirements set forth by USAF.

AF Studies Convertaplane Design

Results of an Army-USAF co-sponsored design competition for a convertaplane are being evaluated by Air Force, with a development contract scheduled for the winner.

Specifications were delivered to interested segments of the aircraft industry in September (AVIATION WEEK Sept. 18). To date, 17 aircraft companies have submitted designs to meet Army's desire for a plane that can rise vertically like a helicopter and fly forward with the speed of conventional aircraft.

Air Force and Army have completed an engineering study to determine general characteristics called for in the competition last June (AVIATION WEEK May 22). The study confirmed the practicability of earlier Army study and resultant requirements for a convertaplane capable of a 300-mph. forward speed, a hovering ceiling of 5000 ft., and a service ceiling of 16,000 ft.

The problem involved is mechanically complex: achievement of a flyable aircraft capable of changing its axis of thrust from vertical to horizontal and back to vertical while in flight. The ultimate aim is development of a troop- or cargo-carrying assault transport capable of operation under all terrain and weather conditions. The convertaplane currently desired by Army, and which will probably evolve from the present competition, is a one- or two-place craft for use in front-line reconnaissance and air rescue operations.

Designers working on the convertaplant design have pointed out that excessive power required in the initial climb thus far has been a formidable obstacle. But now the development of the gas turbine engines, with its higher power output per pound of weight, and improvements in internal combustion engines have brought the convertaplane much nearer.

Estimates are that the first prototype convertaplane will appear in the next three years. Funds for the development of the new type plane are being supplied jointly by the Army and the Air Force.

FINANCIAL

EAL Strengthened by PAA Deal

Surprise interchange agreement is blow to National and gives PAA participation in East Coast traffic.

The proposed equipment interchange plan of Eastern Air Lines and Pan American World Airways may settle a long-pending troublesome issue; and usher in a new era of good-will—but at the same time create new problems.

Subject to Civil Aeronautics Board approval, Eastern and Pan American propose a through one-plane service between New York and other points in the northeastern U. S. served by Eastern and certain Latin American points served by Pan American out of the Miami, Fla., gateway.

▶**Surprise Deal**—This completely unexpected development may prove to be one of the most astute moves in airline history, writing finis to an equally bizarre chain of events set in motion by CAB in September, 1948. At that time, the Board launched an investigation into possible dismemberment of National Airlines. Extensive hearings were conducted to determine whether the public interest might not better be served if various segments of National were absorbed by Pan American, Eastern, Delta or some "other carrier."

National, after failing to have the CAB dismiss the investigation, resorted to a few strategems of its own to make dismemberment difficult if not impossible. One of its first moves was to sell 174,000 shares of its stock to W. R. Grace & Co. in March, 1949 at $5.50 a share, approximating the then book value. (Current quotations are around $14 per share.) An additional 172,000 shares, at approximate book value, were placed under option to the same group.

▶**National Counter Move**—Shortly thereafter, National offered to sell 346,000 shares to Pan American, matching the block made available to the Grace interests. The proposed additional sales to Pan American and W. R. Grace & Co. were contingent upon an equipment interchange agreement between National, Pan American-Grace (Panagra) and Pan American Airways at the New York and Miami gateways.

W. R. Grace & Co. and Pan American jointly own Panagra which operates along the west coast of South America. W. R. Grace & Co. has strongly espoused a direct entry into Miami for Panagra, but has been stalemated by the objections of Pan American. A compromise on this issue was resolved by an equipment interchange agreement between Panagra and Pan American at Panama.

Presumably, the Grace group saw an opportunity in the National proceedings to force Pan American into a favorable arrangement for Panagra. Further, in the process, National acquired much needed cash and a potent ally. To avoid working at cross-purposes, W. R. Grace & Co. in the meantime sold 70,000 shares of Eastern to complete liquidation of its one-time 80,000 share investment in that airline. This sale was accomplished at a substantial profit to W. R. Grace & Co.

▶**Times Change**—Pan American conditioned any purchase of the National shares made available for this purpose on the interchange agreement with National being approved by CAB. Protracted hearings were held. National and Pan American were unable to present an arrangement complete in all details for Board approval. With National's previous financial difficulties largely cured, the carrier no longer felt the same compulsion to move on this interchange proposal.

As a result, it is alleged to have repudiated its earlier agreements on interchange with Pan American. At first, Pan American indicated that it might seek court action holding National to its agreement. In the current surprise move with Eastern, Pan American now asserts it will move for "dismissal of proceedings relating to agreements providing for stock ownership and equipment interchange with National."

The proposed National arrangement would have been detrimental to Eastern. The current proposal if approved, obviously will strengthen Eastern's position considerably.

▶**Grace Shy**—W. R. Grace & Co. has been invited to have Panagra participate in this new Eastern interchange arrangement but so far has declined to do so. It is on record with CAB as preferring to effect an interchange agreement with National. This may well represent the resurgence of Panagra's persistent aim for a direct entry into the Miami gateway.

Moreover, W. R. Grace & Co. remains an important stockholder in National, holding about 17½ percent of the outstanding shares. At current market quotations, this commitment can give the Grace group a capital profit of around $1.5 million on an original investment of less than $1 million.

▶**EAL Winner**—In the meantime, Eastern is emerging in a strongly enhanced position throughout the eastern seaboard. Only recently the company completed with CAB approval and is now conducting an equipment charter arrangement with Northeast providing for the operation of the latter's Convair equipment between Boston and Washington, D. C. This permits Eastern to provide greater frequency of service between Washington, D. C., and New York and into the New England area.

Moreover, Eastern will soon provide nonstop service between New York and Puerto Rico as a result of a recent decision of CAB approved by the President. This will provide an important source of new traffic and interestingly enough will place the company in direct competition with Pan American over this segment. Previously, Eastern's service to Puerto Rico was confined to a route from Miami.

Pan American, previously denied domestic routes of its own, including one from Miami to Boston, may now participate in traffic in this area through the proposed arrangement with Eastern.

It is highly significant that the Eastern-Pan American proposal is complete in every detail as to the equipment interchange arrangement, including number of roundtrips per week, type of equipment, division of revenues and expenses and all other elements entering into the picture.

▶**EAL-NAL Agreement**—The current maneuvers completely overshadow an interchange proposal pending between Eastern and National. Under this arrangement, Eastern would fly its planes from Houston, its westernmost terminus, to Miami from New Orleans over National's routes, permitting more economical scheduling as well as providing new service. By the same token, National's planes could proceed west over Eastern's route from New Orleans to Houston. If approved by CAB, this arrangement would further strengthen Eastern's route structure, this time in the Southeast, and, could prove effective in blocking Delta's pending application for a new route in this general area.

The Board has indicated it is strongly in favor of the equipment interchange principle. In fact, in an unprecedented action of its own (AVIATION WEEK, Dec. 4, 1950), it requested Eastern to enter into agreements with two other carriers to provide through air service between Miami and several midwestern cities. It is this active endorsement of the equipment interchange approach by CAB which provides a favorable atmosphere for the current Eastern-Pan American proposal. —Selig Altschul

NEW!

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Cities Service joins with Eastern Air Lines to inaugurate another great advance

The *Flat-Tops* are on duty now—making notable service records. With these remarkable new tank trucks, Cities Service is fueling Eastern Air Lines planes at LaGuardia, Newark, and Boston's Logan Airport. Never before has there been any approach to the safe, speedy, convenient fueling now made possible by Cities Service *Flat-Tops.*

You'll be interested in major *Flat-Top* features listed here. Each one adds evidence that Cities Service is in the forefront of aviation progress. That's why fields offering Cities Service products are winning preference today, among those eager for topnotch quality and service.

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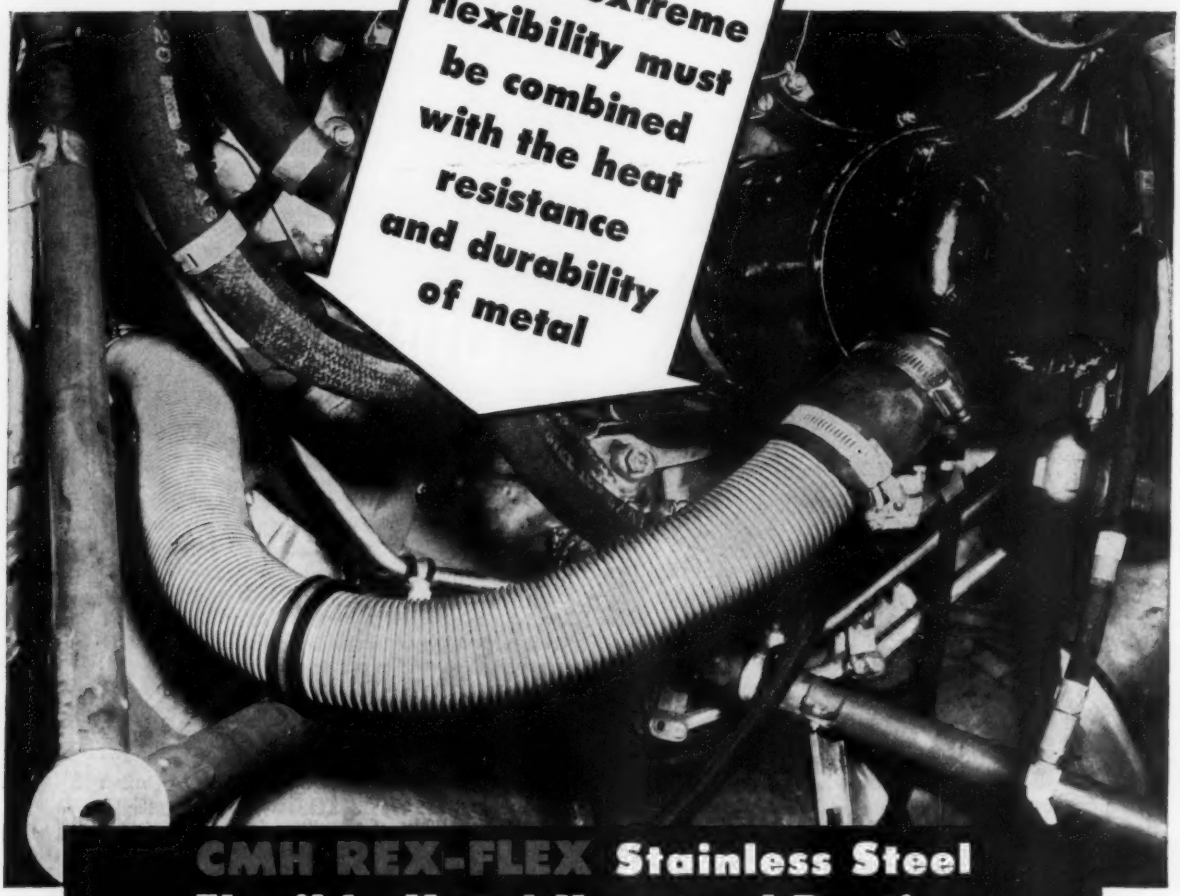

CMH REX-FLEX Stainless Steel Flexible Metal Hose and Ducting

Whether it's a cross ignition tube for the newest jet job or ducting for the pilot's foot warmer in an air freighter, there's a CMH flexible metal hose product to do the job more dependably and with greater safety. At CMH, years of experience is combined with the most modern fabrication methods to produce stainless steel ducts . . . hose . . . connectors . . . and bellows that assure high flexibility and maximum resistance to fire, fatigue and high and low temperatures.

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PRODUCTION

$14 Million for Lockheed Planes

Lockheed Aircraft Corp., Burbank, Calif., with awards totaling $14 million for aircraft, leads the list of negotiated contracts released by USAF for the week ended Jan. 26. Bendix Products div. got $1,849,885 in awards for wheel and brake assemblies. Total contracts for the period were $62,069,778.

Aerial Machine & Tool Corp., Long Island City, safety belts for various aircraft, Cl. 03F, $27,280.

Aircooled Motors, Inc., Syracuse, N. Y., miscellaneous spare parts; assemblies and subassemblies, Cl. 02P, $31,400.

AiResearch Mfg. Co., div., Garrett Corp., Los Angeles, refrigeration turbines for aircraft, Cl. 03F, $48,409.

AVCO Manufacturing Corp., Cincinnati, glide path receivers, Cl. 16A, $1,244,269.

Bendix Products div., Bendix Aviation, South Bend, Ind., wheel & brake assemblies, Cl. 03B, $138,778; wheel & brake assemblies, Cl. 03B, $1,279,000; wheel & brake assemblies, Cl. 03B, $283,457; wheel & brake assemblies, Cl. 03B, $148,650; carburetor spare parts and fuel injection spare parts for aircraft, Cl. 03D, $875,378.

Bendix Radio div., Bendix Aviation Corp., Baltimore, tuning meters, Cl. 16E, $37,780.

Cleveland Pneumatic Tool Co., Cleveland, miscellaneous spare parts for aircraft, Cl. 03G, $130,000.

Consolidated-Vultee Aircraft Corp., Ft. Worth, Texas, mobile training units, Cl. 01B, $118,638.

Curtiss-Wright Corp., Propeller div., Caldwell, N. J., retainer for bearings, Cl. 03A, $53,209; propeller assemblies, Cl. 03A, $984,872.

Eclipse-Pioneer div., Teterboro, N. J., inverters, Cl. 03C, $470,910.

Emerson Radio & Phonograph Corp., New York, N. Y., glide path receiver, Cl. 16A, $869,817.

Fairchild Aircraft Div., Fairchild Engine & Airplane Co., Hagerstown, Md., miscellaneous assemblies and subassemblies, Cl. 01R, $36,472.

Fairchild Camera & Instrument Corp., Jamaica, N. Y., echo boxes, Cl. 16J, $297,574.

General Electric Co., Dayton, aircraft generators, Cl. 03C, $1,146,014.

General Electric Co., Schenectady, N. Y., turbosuperchargers, Cl. 03E, $28,926; spare nozzleboxes, Cl. 03E, $902,428.

General Electric Co., Syracuse, N. Y., motor assembly, Cl. 16E, $32,250.

General Motors Corp., Allison div., Indianapolis, engine parts, Cl. 02I, $458,856.

B. F. Goodrich Co., Akron, wheel & brake assemblies, Cl. 03B, $341,462; wheel assemblies, Cl. 03B, $72,586; wheel assemblies, Cl. 03B, $355,000.

Goodyear Tire & Rubber Co., Akron, wheel & brake assemblies, Cl. 03B, $244,370; wheel assemblies, Cl. 03B, $35,665; wheel & brake assemblies, Cl. 03B, $291,168; wheel & brake assemblies, Cl. 03B, $91,836; wheel assemblies, Cl. 03B, $174,987; wheel assemblies, Cl. 03B, $144,894; wheel assemblies, Cl. 03B, $56,990; wheel assemblies, Cl. 03B, $123,255; wheel & brake assemblies, Cl. 03B, $1,967,013; wheel assembly, Cl. 03B, $26,086.

Gould-National Battery Co., Depew, N. Y., aircraft batteries, Cl. 03C, $314,952.

Grand Central Aircraft Co., Glendale, Calif., reconditioning of aircraft, $19,200,000; repair & overhaul of aircraft items, Cl. 01F, $2,835,000.

Harding Devices Co., Dallas, Tex., spare parts for fuel system, Cl. 03I, $41,710.

Hoffman Radio Corp., Los Angeles, components for radar direction finding assembly, Cl. 16A, $40,124.

Jack & Heintz Precision Industries, Inc., Cleveland, starters, Cl. 03C, $228,322; generators, aircraft, Cl. 03C, $57,000.

Walter Kidde & Co., Inc., Belleville, N. J., oxygen bottles and valves for various aircraft, Cl. 03F, $33,830.

Kollsman Instrument Corp., Elmhurst, N. Y., maintenance for airspeed indicators, Cl. 05E, $51,209.

Leland Electric Corp., Dayton, inverters, Cl. 03C, $92,160.

Lewis Engineering Co., Naugatuck, Conn., temperature bulbs, Cl. 05D, $34,705.

Lockheed Aircraft Corp., Burbank, Calif., for aircraft, Cl. 01L, $5,000,000; for aircraft, Cl. 01L, $7,000,000; for aircraft, Cl. 01L, $2,000,000.

Minneapolis-Honeywell Regulator Co., Minneapolis, components for turboregulator system, Cl. 03E, $29,436; components for regulator systems, Cl. 03E, $77,387.

North American Aviation, Inc., Los Angeles, kits for aircraft, Cl. 01M, $27,975; wing tanks, Cl. 03L, $1,000,000; spare parts for aircraft, Cl. 01M, $4,271,273.

North American Aviation, Inc., Port Columbus, O., miscellaneous assemblies and subassemblies, Cl. 01C, $100,000.

Northrop Aircraft Inc., Hawthorne, Calif., miscellaneous assemblies and subassemblies, Cl. 01C, $55,000.

Pacific Mercury Television Mfg. Corp., Van Nuys, Calif., glide path receivers, Cl. 10A, $721,105.

Pesco Products div., Borg-Warner Corp., Bedford, O., fuel booster and hydraulic pumps, Cl. 03I, $67,255.

PMR Electronics, Inc., New Canaan, Conn., component parts for radar beacon, Cl. 16A, $40,920.

Pratt & Whitney Aircraft div., United Aircraft Corp., E. Hartford, Conn., engine trainers, Cl. 28C, $69,465; fuel flow transmitters, Cl. 02A, $41,400.

Republic Aviation Corp., Farmingdale, L. I., N. Y., kits & modernization modification parts for assemblies & subassemblies for aircraft, Cl. 01N, $100,000; increase in spare parts, Cl. 01N, $550,000.

Scintilla Magneto div., Bendix Aviation Corp., Sidney, N. Y., engine ignition analyzers, Cl. 05D, $202,226; switch assemblies, Cl. 03C, $52,271.

Solar Aircraft Co., San Diego, Calif., maintenance spare parts for aircraft, Cl. 01F, $270,980.

Sperry Gyroscope Co., Long Island, klystrons, transformers, modulator parts, barretters, Cl. 16E, $70,218; automatic pilot components, Cl. 05F, $1,969,611.

Thompson Products Inc., Cleveland, pumps and spare parts, Cl. 03I, $39,126.

Titeflex Inc., Newark, N. J., high tension ignition harness, Cl. 03H, $369,927.

Union Switch & Signal Co., Swissvale, Pa., bomb tails, Cl. 11F, $1,000,000.

Varo Mfg. Co., Inc., Garland, Tex., spare parts for converters, Cl. 03C, $53,056.

Western Electric Co., New York, N. Y., TR box, Cl. 16E, $35,805; test indicator, Cl. 16J, $106,406.

Weston Electrical Instrument Corp., Newark, N. J., temperature indicators, Cl. 05D, $61,644; temperature indicators, Cl. 05D, $77,797; temperature bulbs, Cl. 05D, $34,125.

PRODUCTION BRIEFING

► **Piasecki Helicopter Corp.** has reorganized its manufacturing division into five departments: manufacturing control, factory, purchasing, subcontracting and plant engineering. Subcontracting has more than tripled in the past year.

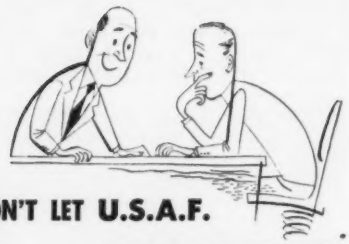
► **Servo-Tek Products Co.,** Paterson, N. J., has completed new construction adding 60 percent floor area to provide more production space for making electromechanical equipment.

► **Reliance Electric & Engineering Co.,** Cleveland, electric motors and electronic controls maker, will soon start construction of a new 130,000-sq. ft. one-story building in Euclid. Plans are to have the structure ready for occupancy by the middle of the summer.

► **Sperry Gyroscope Co.** foresees hiring of about 3000 new workers this year to handle stepped-up defense schedules. The firm now employs 10,500.

► **Pacific Airmotive Corp.,** has received an additional Air Material Command contract to renovate mothballed F-51 Mustang fighters. The new work will necessitate PAC's adding 600 more employes to the present staff of more than 1200 at Burbank.

► **Hydro-Aire, Inc.,** Burbank, has sold a Hytrol anti-skid braking system to the British Ministry of Supply for test installation on the Handley Page Hermes 5 turboprop airliner. The Hytrol system will be tested with a view toward extensive use of this equipment on other British planes.



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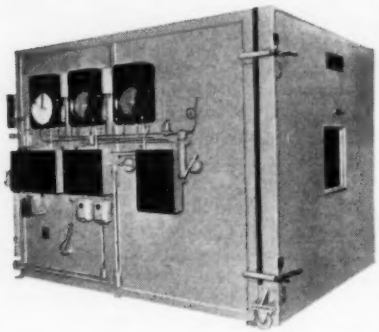

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USAF Awards

Air Materiel Command Procurement Division makes available to AVIATION WEEK recent bid awards, shown on this page. Requests for further information should be addressed to Contracting Officer, AMC, Wright-Patterson AFB, Dayton, Ohio, attention: MCPPSX72.

ABSTRACTS

For zinc base alloy ingots (51-844):
National Lead Co., Cincinnati, on a bid of $41,040.

For nitric white fuming acid (51-1019):
Hercules Powder Co., Wilmington, Del., on a bid of $180,000.

For fire fighters protective hoods (51-1051):
Mine Safety Appliances Co., Pittsburgh, on a bid of $354,432.87.

For sanders (51-1145):
Companies sharing: Boice-Crane Co., Toledo, on a bid of $766.50; Delta Power Tool div., Rockwell Mfg. Co., Milwaukee, on a bid of $272.96; Onsrud Machine Works, Inc., Chicago, on a bid of $552; Skilsaw, Inc., Chicago, on a bid of $409.55, and Porter-Cable Machine Co., Syracuse, N. Y., on a bid of $893.25.

For steel, chrome nickel (51-577):
Companies sharing: Allegheny Ludlum Steel Corp., Brackenridge, Pa., on a bid of $11,390.72, and Tube Distributors Co., Inc., Brooklyn, on a bid of $132,670.35.

For propeller assembling posts (51-733):
Companies sharing: Steel Products Engineering Co., Springfield, O., on a bid of $526, and Bunell Machine & Tool Co., Cleveland, on a bid of $47,388.50.

For bushing assemblies (51-838):
Companies sharing: Master Machine Products, Co., Huntington Park, Calif., on a bid of $8334; Aero Supply Mfg. Co., Inc., Corry, Pa., on a bid of $5481.50, and Air Associates Inc., Teterboro, on a bid of $1524.

For adapter assemblies (51-840):
Companies sharing: Weatherhead Co., Cleveland, on a bid of $14,625; Salen Engineering & Mfg. Co., Columbus, O., on a bid of $3189; Parker Appliance Co., Cleveland, on a bid of $1310; Ohio Screw Products, Inc., Elyria, O., on a bid of $15,163.50; Dumont Aviation & Supply Co., Long Beach, Calif., on a bid of $3250, and Air Associates Inc., Teterboro, on a bid of $1650.

For connectors, plugs (51-971):
Cannon Electric Development Co., Los Angeles, on a bid of $27,303.90.

For generators (51-1072):
Companies sharing: Measurements Corp., Boonton, N. J., on a bid of $18,172; Brown Electro-Measurement Corp., Portland, Ore., on a bid of $1566; New London Instrument Co., Waterford, Conn., on a bid of $7771.50; General Radio Co., Cambridge, Mass., on a bid of $1314, and Cole Instrument Co., Los Angeles, on a bid of $483,30.

For wattmeters (51-1108):
Companies sharing: General Electric Co., Dayton, on a bid of $1516.62; General Radio Co., Cambridge, Mass., on a bid of $5849.60, and Radio Wire Television Inc., New York, on a bid of $3517.50.

For 30,000 controller assemblies (51-1123):
Erie Mfg. Co., Milwaukee, on a bid of $15,960.

For shutter assemblies (51-596):
Hycon Mfg. Co., Pasadena, Calif., on a bid of $65,042.60.

For countersinks (51-819):
Companies sharing: Zephyr Mfg. Co., Inglewood, Calif., on a bid of $14,000; Schrillo Aero Tool Eng. Co., Los Angeles, on a bid of $15,225; and J. T. Slocomb Co., Providence, R. I., on a bid of $23,400.

For 57 timers (51-860):
Standard Electric Time Co., Springfield, Mass., on a bid of $2635.20.

For ethylene glycol bromochloromethane (51-914):
Companies sharing: Puritan Co., Inc., Rochester, N. Y., on a bid of $58,298.94; Octagon Process Inc., Brooklyn, N. Y., on a bid of $34,800, and Protective Treatments, Inc., Dayton, O., on a bid of $117,742.68.

For oil circuit breakers (51-1073):
Allis-Chalmers Mfg. Co., Boston, Mass., on a bid of $253,625.

For aircraft hardware (51-1099):
Companies sharing: Redford Stamping Co., Inc., Detroit, on a bid of $4447.45, and Phoenix Trimming Co., Chicago, on a bid of $10,150.

For pneumatic riveters (51-1120):
Companies sharing: Cleco Div. of Reed Roller Bit Co., Houston, on a bid of $29,992.50, and Independent Pneumatic Tool Co., Aurora, Ill., on a bid of $48,400.

For 200 floodlights (51-1131):
General Electric Supply Corp., Dayton, O., on a bid of $6316.

For 3,500 temperature bulbs (51-1133):
Weston Electrical Instrument Corp., Newark, N. J., on a bid of $34,125.

For 2 grinder tool and cutters (51-1220):
Gallmeyer & Livingston Co., Grand Rapids, Mich., on a bid of $5210.

For cotton webbing (51-1188):
Companies sharing: Phoenix Trimming Co., Chicago, on a bid of $137,832, and American Cord & Webbing Co., Inc., New York, on a bid of $38,220.

For lead pig (51-776):
Companies sharing: National Lead Co., Cincinnati, on a bid of $39,250, and Federated Metals Div., American Smelting & Refining Co., Houston, on a bid of $33,926.40.

For exposure meters (51-561):
DeJur-Amsco Corp., Long Island City, N. Y., on a bid of $12,995.30.

For bolts (51-569):
Companies sharing: Cooper Precision Products, Los Angeles, on a bid of $7522.50; Aircraft Hardware Mfg. Co., Inc., N. Y., on a bid of $8250; Aero Supply Mfg. Co., Inc., Corry, Pa., on a bid of $4362; Dumont Aviation & Supply Co., Long Beach, on a bid of $50,234.50; Conover Co., Grand Prairie, Tex., on a bid of $4658; Salen Engineering & Mfg. Co., Columbus, O., on a bid of $3537.50, and Western Washer & Stamping Co., Los Angeles, on a bid of $822.50.

For adapters (51-637):
Companies sharing: American Phenolic Corp., Chicago, on a bid of $1652; Westinghouse Electric Supply Co., Dayton, O., on a bid of $1890, and Graybar Electric Co., Dayton, O., on a bid of $333.

For bolts (51-678):
Companies sharing: Alloy Mfg. Co., Chicago, on a bid of $7854; Aircraft Hardware Mfg. Co., Inc., N. Y., on a bid of $260; Crocker Mfg. Co., Los Angeles, on a bid of $855; MacWhyte Co., Kenosha, Wisc., on a bid of $450, and Aero Supply Mfg. Co., Inc., Corry, Pa., on a bid of $602.

For air crew clothing (51-814):
Companies sharing: L. W. Foster Sportswear Co., Inc., Philadelphia, on a bid of $24,750; Tru-Fit Trousers, Traverse City, Mich., on a bid of $235,876.80; Wm. Lapedes & Son, D.B.A. Lion Uniform Co., Dayton, O., on a bid of $223,106.40; Aviators Clothing Co., Inc., Beacon, N. Y., on a bid of $532,901.28, and Reed Products Inc., Milwaukee, on a bid of $446,588.40.

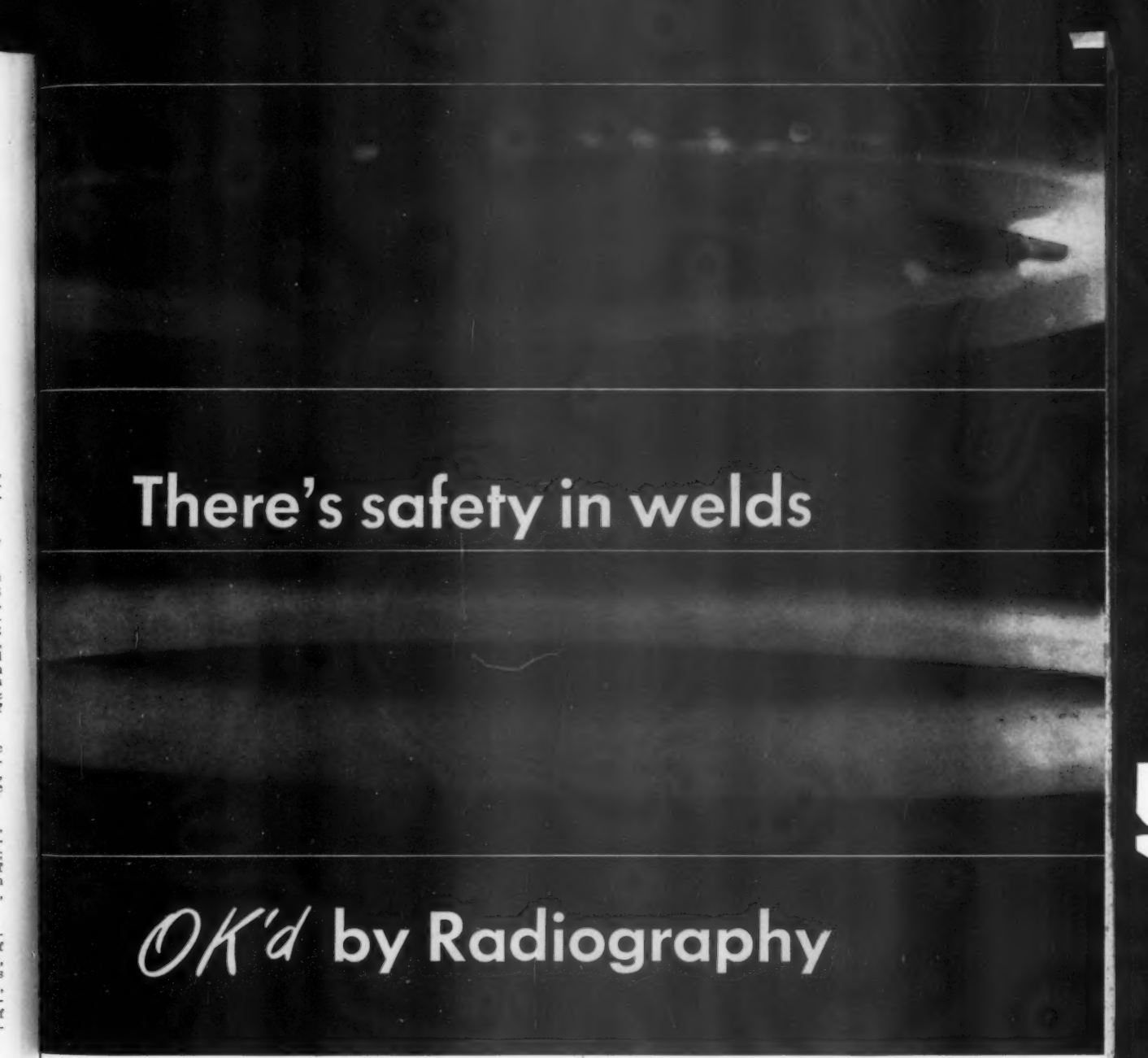
For air crew mitten gloves (51-829):
Companies sharing: Midwest Glove Corp., Chicago, Ill., on a bid of $53,550; Alma Knitting Mills, Inc., Gloversville, N. Y., on a bid of $49,500, and Illinois Glove Co., Champaign, Ill., on a bid of $247,200.

For transformers (51-841):
Companies sharing: Vernon Co., New York, on a bid of $3988; Electronic Transformer Co., New York, on a bid of $1600, and Robert M. Hadley Co., Los Angeles, on a bid of $1196.

For 441 work benches (51-900):
National Products Co., Grand Haven, Mich., on a bid of $40,800.64.

For cable (51-901):
Companies sharing: Graybar Electric Co., Dayton, O., on a bid of $819.60; Electric Auto-Lite Co., Port Huron, Mich., on a bid of $1304; Eastern Tube & Tool Co., N. Y., on a bid of $23,136.40, and Alpha Wire Corp., New York, on a bid of $5400.

For rivets (51-903):
Companies sharing: Air Associates Inc., Teterboro, N. J., on a bid of $5680.80; Dumont Aviation & Supply Co., Long Beach, on a bid of $6187.60; Tubular Rivet & Stud Co., Wollaston, Mass., on a bid of $5046.90, and Reed & Prince Mfg. Co., Worcester, Mass., on a bid of $340.20.



Radiographs showing welds in gas tanks. Lower radiograph shows acceptable tank weld.

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Safety Need Not Cut Down Performance

Statistics can show engineers as well as management that economics demands both safety and progress.

By Jerome Lederer*

One often hears that safety tends to freeze progress, or that performance is of far greater importance than safety.

Physical risk has always been inherent in aviation development, and aviation progress should not be permitted to suffer by an unwillingness to face unknown dangers. But insofar as known dangers are concerned, progress and safety should march hand in hand. Economic pressure is compelling it to do so.

Authorities and those whose business it is to study aviation economics declare that accidents have a profound adverse effect on public confidence, on revenue and on the development of air travel.

▶ **Safety Not Important?**—A few responsible executives and engineers in the aviation industry do not wholly agree that safety is economically very important. A few years ago, the chief powerplant engineer of one aircraft manuacturer declared that his designs would emphasize performance above safety.

Others take a callous attitude—"Let's accept the risk and hope it won't happen to us. If it happens, insurance will cover a large share of the loss and traffic will come back eventually."

Some engineers claim that statements on loss of revenue due to accidents are on the wild side, cannot be proven. They have a good point because it is very difficult to secure accurate figures on loss of public confidence in the safety of air travel and the consequent loss of revenue following accidents. In some periods, the backlog of waiting passengers is so high that even numerous cancellations of reservations by a frightened public may not affect the load factors.

Or the accident may occur during a seasonal decline in traffic and it is not easy to define the difference between the drop that the traffic curve might be expected to follow without accidents and the course actually followed after a well-publicized accident occurs. However it seems necessary to convince some engineers of the economic importance of safety as against performance if their engineering judgment is to be influenced towards safety.

▶ **Economic Angle**—Selig Altschul, formerly chief economic analyst for the CAB and financial consultant for the Congressional Aviation Policy Board, in his "A Study and Appraisal of United Air Lines, Inc." declares:

". . . Once relieved of the restraints imposed by wartime operations, the airlines reached almost six billion revenue passenger miles during 1946, up some 77 percent over 1945. In 1947 and 1948, volume was held up to the six billion level in each of the two years. This seemingly static showing was a direct consequence of the series of accidents which occurred in the winter of 1946-47 and in the early summer of 1947. This sequence of misfortunes was followed by a new group of accidents. . . . All this seriously discouraged potential air travel and was reflected in low passenger load factors."

▶ **Rick Speaks**—In his report to the stockholders of Eastern Air Lines, Inc., for the year 1949, Capt. E. V. Rickenbacker said:

"Another favorable factor contributing to the increase in passenger traffic in 1949 was a perfect safety record from August, 1948 through November, 1949, marred only by two accidents involving mid-air collisions with military aircraft. In these accidents, both of which involved your company, the airline and its personnel were completely absolved of blame. Nevertheless, the latter of these accidents in November, coupled with other air accidents world-wide, had an exceptionally depressing effect on air travel during the last two months of the year. It is true that your company's earnings declined somewhat in the face of rising costs and the effect of accidents on traffic volume."

▶ **Cost Enormous**—The traffic department of another large airline, after studying its variation of traffic with accidents, concludes that effects of a well-publicized accident or series of accidents are felt for about two months. It results in an average loss of 10 percent in passenger revenue during this period. This loss, at present levels of traffic, would amount to $1.7 million for this one airline.

In addition to loss of passenger revenue which accidents bring about, there are many other financial losses: Loss of use of equipment, investment in trained personnel, liability suits, hull losses. Unlike passenger revenue losses which are approximations, these are tangible and cannot be denied. They can be reckoned in fairly exact millions of dollars lost per year. The cumulative financial losses caused by airline accidents are now so enormous that the airlines can hardly afford to have them.

Management knows what an accident costs and it is safe to say that the moral and ethical climate in executive offices today is such that airline officials feel a social responsibility for the safety of the passengers who entrust their lives to management. What then is it that will cause one airline to take an aggressive attitude towards the adaption of safety developments while others assume a negative or do nothing attitude?

▶ **White's Analysis**—Here is what Dr. C. S. White of the Lovelace Clinic had to say at the September, 1950, meeting of the Society of Automotive Engineers, in Los Angeles:

"Emphasis must be placed on doing. Let the airline medical directors, the executives, the pilots, ask themselves how many ditching drills, fire emergency drills, emergency equipment inspections, procedures to be used in explosive decompression have been actually practiced on their airlines over the past six months.

"Ask them, gentlemen, and in their answer you will find the explanation for past and future infringements of safe operation of aircraft. You will also find the explanation for the removal of an oxygen mask by a commercial air crewman at an unsafe altitude and under stressing conditions during a recent accident because the mask contained no microphone or means of using a microphone. I do not condemn the air crewman—he had to contact an airport for emergency landing instructions—but I do condemn the system which allows planes to be equipped for almost a year with gear so potentially dangerous. One, only one, emergency drill simulating explosive decompression would have revealed this deficiency.

"This is but a sample of many examples which may be cited to emphasize the necessity for action and the importance of including emergency procedures in training and refresher work.

* Director, Flight Safety Foundation, Inc. Abstracted from a paper delivered at the annual meeting of the Society of Automotive Engineers, Jan. 8-12, Detroit, Mich.

Significant details, no matter how apparently obvious, should not be overlooked."

► **Limited Outlook Unwise**—It may be presumptuous to put myself in the place of management when an item of safety such as the matter of providing microphones in oxygen masks comes before it. In the case which Dr. White mentions, management probably was alerted by its staff to the possible need for microphones under the conditions mentioned and also in the event of fire or smoke in the cockpit. If it turned down the proposal to install microphones it made an error in judgment and not one of negligence.

The executives or committees that decide such matters must balance economic factors against accident probabilities because the function of an airline is to operate at a profit. The committee is likely to err on the side of economy if it regards a particular item which is technically desirable, such as a microphone, as only an isolated need, one which may not be required in several years of flying. On this basis they might table the item—to use the money for other purposes.

Such decisions based on a limited economic outlook will ultimately catch up with operation, with disastrous financial results.

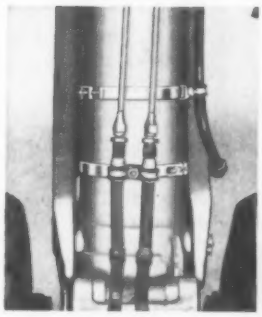
► **All Factors Important**—Coming to a conclusion that an important item may be needed so seldom that it should not be adopted is a fundamental error in safety thinking in aviation. It is true that item A may fail only once in 50,000 hr., item B once in 100,000 hr., item C once in 20,000 hr., but the cumulative total of all the things that go wrong averaged up in 1950 in scheduled passenger operations to one accident in every 12,400,000 mi. of flying of which seven were fatal, killing 145 passengers. It is a very good record but not good enough. It does not include near accidents.

Management should at all times recognize that safety in aviation is dependent on attention to **all** the things that may go wrong. If each safety measure is considered independently of the whole, judgment becomes distorted and may lead to dangerous decisions on the economics of safety expenditures.

A decision to adopt or deny a safety measure may at times be influenced by familiarity with a dangerous operation and the success that management has had in coping with it. For instance, a dangerous letdown procedure may have been followed for years without accident. But if a dangerous act is performed often enough it is very likely to result in an accident, especially in flying where safety is so dependent on the correct functioning of the many factors that comprise the sequence of every operation.

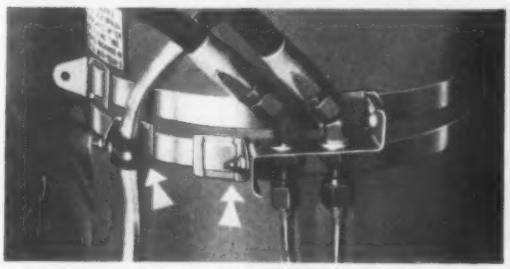
ENGINEERS NOTEBOOK

Fast, efficient, positive attachment for hydraulic lines, wiring accessories.



Marman support clamps perform an infinite variety of tasks. The lug support clamp illustrated fastens hydraulic lines to the main landing gear on a large bomber. It is ideally suited for applications where a highly stressed machined part prohibits the use of welded lugs.

The clip support shown below accomplishes a similar purpose except that it holds hydraulic lines farther away from the strut and provides a lighter assembly with slightly less strength. Its use may be preferred where many such supports are required on one ship.



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Management may at times be compelled to approve relatively dangerous measures because remedies are not practical: the so-called calculated risk. But it seems shortsighted to continue a dangerous act involving public safety when remedies are available.

▶ **Sharp View**—Sometimes a decision on adopting a safety measure is determined by a vote of a committee or board of directors. Management would not want its pilots to vote when it is safe to make a letdown; it wants its pilot to **know** that it is safe. Then why should management vote whether it is safe or not to adopt or turn down a safety measure? Scientists object to settling of technical matters by counting noses. They claim that no progress is made by a statistical appraisal of the current level of ignorance.

Safety is big business. The prevention of an accident should be regarded as much of a business transaction as any financial deal that calls for the close attention and best brains of management, since it just as surely involves the protection of capital or the realization of profit.

Statistics have a very important place in rationalizing the solution to safety problems, but there exists a tendency to resist a design change requiring the adoption of a safety measure until sufficient statistics are gathered to prove that the corrective step is necessary. This line of reasoning can be carried to illogical extremes in both directions, one of requiring too many statistics, or the other of acting before enough are secured.

If I touch a hot stove once, I do not need a series of additional contacts to realize that I shall burn myself if I touch it again. One statistic is enough. Common sense tells me that. On the other hand, if in backing my car out, I scrape the fender against a post once per year, I merely swear; if I do it once per month I'll take remedial action because statistics, or mass data, has given me the common sense or knowledge I lacked to take corrective action.

In air transportation, however, one is dealing with public safety instead of personal safety and the public does not like to be used as a guinea pig to obtain statistics at the expense of its safety. This may appear illogical to engineers, but it is understandable. The application of remedial measures cannot wait for statistics if public confidence is to be retained.

▶ **Public Acceptance of Danger**—To what degree the public is willing to take chances has not been quantitatively determined. Here is a fine opportunity for statisticians to assist the industry and the government in obtaining rational determination of safety regulations. For example, the chance exists of a pilot dying of, say, a heart attack. The public does not readily take the risk of flying with one pilot. Passengers become uneasy when one of the two pilots leaves his station and are reassured by the presence of a co-pilot.

Here we have one limit of the public acceptance of danger. The public wants two pilots for safety. But the chance also exists of both pilots becoming incapacitated. Experience has proven this to be an inconsequential chance, and the public is willing to go along with that remote risk. That is the other limit of the public acceptance of danger. So here is a measurable limit of risk which the public is willing to accept.

The one chance in 160 million of an only pilot becoming incapacitated in flight is one boundary, the chances of two pilots becoming incapacitated at the same time is the other—about one in 25 quadrillion. However, only a few incidents in which both pilots were incapacitated would compel remedial measures to appease the public. (I am not advocating the use of three pilots but I am using this as an example.)

▶ **Incidents Cumulative**—The effect of waiting for statistics before remedial measures are taken for many of the troubles that occur in aircraft operation would very likely be catastrophic. The designer of a hydraulic system might resent modifications if only one failure or malfunction occurs in say 5000 hr. of operation, the designer of the nose wheel might resist a change order when his nose wheel structure stood up well for 10,000 hr. The designer of the windows might tear his hair if the customer insisted on a change because of only one window failure in 20,000 hr.

Malfunctionings are cumulative, especially for operators of large fleets of aircraft, and though each one may be rare by itself it is likely to combine with the chance permutations and combinations of other incidents, to become a link in the chain of events which may lead to a fatal accident.

On the other hand a change should not be rushed until it is known where the defect exists. It may not be in design but in installation, in material or in maintenance. Here statistics may be necessary to come to a sensible decision.

Where redundancy exists, statistics may safely be obtained and are desirable to avoid wasteful changes or the discarding or grounding of equipment and to determine safe operating life. For instance, if there is some question about furthering the operational life of say sparkplugs, it may be reasonably safe to let them function beyond limits, on one engine out of four. If small cracks appear in the structure it may be reasonably safe to garner statistics if the structure is such that the resulting loss of strength is not critical because the stress

can be taken by surrounding structure.

The point at which management decides to change or abandon an item or procedure requires great dexterity of judgment usually because of the expense involved (unless it adopts the simple rule of Eastern Air Lines' Charley Froesch: "If it isn't reliable, take it off; even if it is reliable, do you need it?").

A typical case would be wheel flanges. Statistics are being compiled of such failures. In one case a part of a flange flew off and was driven by the propeller through the fuselage into the pelvis of a boy. Statistics continue to be gathered. At what point will or should action be taken? Management needs a formula to guide it in such problems. An expert on statistical probability should be able to develop it.

▶ **Accident Potentiality**—We often act on events which led to a major accident but wait for statistics to build up before we act on incidents which do not result in major accidents. As Heinrich points out in his book "Industrial Accident Prevention": "The expression 'major' or 'minor' accident is misleading. In one sense of the word there is no such thing as a major accident. There are major and minor injuries, of course, and it may be said that a major accident is one that produces a major injury. The accident and the injury are, however, distinct occurrences; one is the result of the other, and in the continued use of the expression 'major accident' and in the acceptance of its definition as one that results seriously, there is a decided handicap to effective work."

He shows that in industrial safety in a group of 330 similar accidents, 300 will produce no injury whatsoever, 29 will result in only minor injuries and one will result in a major injury. The moral is, "Prevent the accidents and the injuries will take care of themselves. . . . In accident prevention work, the importance of any individual accident lies in its **potentiality** of creating injury and not in the fact that it actually does, or does not so result."

▶ **Near-Miss Data**—There are fortunately not enough accidents in aviation to furnish the mass data needed for statistical analysis. The problem is to secure information on the near-misses. For example: There are recurring accidents in which pilots fly into mountain tops. In the past six years there have been eleven such accidents involving scheduled airlines, killing 221 passengers.

We learn only of the strikes. How many times did the dead pilot and other pilots now living narrowly miss mountain tops before. In bad weather, the information is for the most part unknown. How many near misses with other aircraft occur and are not reported? In view of the lack of information, what should management do?

One answer to the problem of securing information on near accidents is to have a place where personnel can confess without being ridiculed or punished or publicly cast reflection on fellow workers. A flight engineer not so long ago related how the pilot and co-pilot in using the check list preparing for an approach, had neglected actually to read the hydraulic pressure gage. It was not the flight engineer's function to read the hydraulic pressure but as a matter of curiosity he did, because the gage was of a new type. Much to his surprise it read zero. He immediately informed the captain, who declared an emergency. A safe landing was made but the results could have been disastrous.

He discovered that the captain was responding to the challenges on the check list by habit rather than by actually checking the instruments and controls. He could not tell this to management without crossing the captain. The captain did not consider that it warranted further attention. It is extremely important to know that aircrews are responding to check lists by habit instead of by actually reading the gages.

▶ **Information Important**—Pilots are hesitant to report near collisions with other aircraft for fear of the punitive action that might follow. But such statistics on near accidents should be known if accidents are to be reduced. A way should be found to confess without jeopardizing one's career.

Information on potential accidents is often obtained by casual gossip. Personnel should be encouraged to recognize potential accidents and to bear in mind "Who should I tell what I've just found out." For example, a captain checking his ILS path under CAVU conditions found that it was considerably in error; the cause was determined to be some disturbance in the ignition system. At that time few, if any, pilots realized that such disturbance could throw off the ILS even though the ILS would indicate normal functioning.

In a casual way he mentioned his trouble to fellow pilots a few weeks later. Eventually it got around to management. Such important information should not be allowed to migrate, it should be propelled. The near misses are needed for statistical purposes as well as for any immediate safety measures they might provoke.

▶ **Statistics and Design**—In the absence of statistics, the designer, operator or executive is often forced to rely on professional judgment when deciding a course of action. This should continue to some extent because statistics alone may at times give the wrong answer if all the variables are not included or if they are incorrectly weighted. But the

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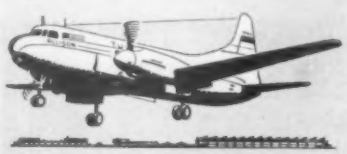

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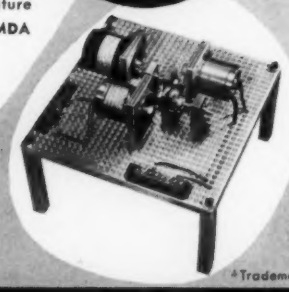

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laws of statistical probability have a great future in aviation when applied to fundamental problems of design and operation.

They are now being widely used in quality control; one airline is using them in connection with its maintenance procedures; the British have led the way in applying statistics to rationalize performance requirements for future aircraft. The application of statistical methods is well illustrated in the report on "Time Utilization and Air Traffic Control," by Dr. D. E. Olshevsky of Cornell.

Statistics can be the tool that will enable the designer or operator to make their technical compromises without so much dependence on intuitive skill or on guesses, intelligent as they may be. Statistics should not be permitted to obstruct the adoption of an obvious safety measure, but the aviation industry is not realizing the full benefits of the statistical approach to its problems.

In preparation for this talk several airlines were asked, "How do you keep your personnel alert for things to watch?" and "What special efforts are you making either to avert an accident or to reduce casualties when one occurs?" Two airlines replied that a complete answer would be a large paper by itself, another replied: "You can answer the questions yourself through your close association with our work."

► **Builder and Customer**—One of the objectives of the queries was to explore the reasons for the numerous criticisms about the "bugs" in modern aircraft as evidenced by Marvin Whitlock's suppressed paper; by L. R. Koepnick's paper "Simplicity As A Goal In The Design of Aircraft Systems," given before the SAE in April, 1948; the comments by Carl Christenson of United Air Lines "Service Testing of Prototype Air Transports" (a paper prepared for Flight Safety Foundation), and by many conversations with operating experts.

The battle is hottest between the air-line engineers who are called upon to provide fixes for deficiencies that show up in service and the designers who build the aircraft according to contract specifications and who are continually beset by the necessity for compromise between weight and performance.

Christenson says: "The accessory requirements oftentimes advance with the technical requirements of the basic airplane and in themselves create a problem which oftentimes enters the field of research and development.

"It is here that the manufacturer must delineate between experimentation and practical application. Too often we find the specifications coupled with experimental devices which in themselves represent as much of a safety problem as the airplane. The aim of the customer and manufacturer should be to provide a basic airplane without resorting to new 'on the spur' developments to get out of the hole of a 'missed approach' to the problem."

And L. R. Koepnick says: "From the very outset it can be seen that, because of the initial specification requirements which are established by the airlines and other customers, a modern airplane must be equipped with many operating systems which in themselves are complex. Therefore, the customer or airlines themselves share to a great extent in the responsibility for the complexity of the modern airplane.

"A careful examination of modern airplanes indicates that the manufacturers have not always installed the simplest and most direct system to accomplish the requirements established by the specifications. Generally systems are found to be intermingled with each other, which, in addition to increasing the complication, also increases maintenance problems and in certain cases provides conditions which might be unfavorable from a safety standpoint. The manufacturer, therefore, is also responsible."

► **Experience Factor**—The operations manager of a large airline telephoned to say, "The airlines cannot afford to continue to act as the testing laboratory for the manufacturers."

Many experts have proposed ways to overcome prototype troubles which would help reduce but would not eliminate all the bugs. One cause of trouble is sacrifice of dependability to weight. A realistic evaluation of the importance of weight versus reliability appears to be in order—a job for a statistician. From the standpoint of design faults per se it appears that supervising engineering personnel may not have a sufficient amount of background experience or that the experience that does exist is spread too thinly over engineering staffs because of rapid growth of the industry and consequent promotion of experienced designers to upper level positions.

On the other hand, the airlines may have been backward in the past in not calling for advice from low echelon but highly experienced and competent personnel—mechanics, maintenance supervisors, line foremen when the specifications were prepared or during acceptance trials.

► **Competition**—This has a bearing too. At a technical meeting last June the chief designer of one large manufacturer of air transports declared that the safety he incorporates in his designs depends on what his competitors do. So competition may work both ways.

Competition also influences safety in the operational field but not as much as in the days when departure into uncertain weather was encouraged by

traffic personnel. Competition is evident between pilots of competing airlines trying to obtain priority for landing, competition may be one of the reasons why some airlines operate to lower minimums than others, but the airlines of the U. S. as a whole deserve the highest commendation for their willingness to cooperate and coordinate on matters of safety. The competitive influence here is well on the way to disappearing, although acceptance of new aircraft may be rushed when a competitive situation compels an airline to put them into operation by a certain date.

Competition is a strong undercurrent that must be recognized in the development of safety. An article on the "Unwritten Laws of Engineering" published in the Journal of the ASME in 1944 has this to say on competition and progress:

"Beware of the perils of security in planning your engineering programs. It is one of the fundamental anomalies of human experience that too much preoccupation with the pursuit of security is very apt to lead to greater danger and insecurity. In a competitive world you must take chances—bold and courageous chances--or else the other fellow will, and he will win out just often enough to keep you running, all out of breath, trying to catch up. So it behooves you as an engineering executive to 'stick your neck out', and keep it out, by undertaking stiff development programs, setting a high mark to shoot at, and then working aggressively to realize your objectives."

This observation is not consistent with safety if the objectives can be more completely and accurately defined in the future than they have been in the past. The operators will then be spared the enormous troubles and expense in overcoming the many past hazards that have been introduced by new equipment. Safety objectives should be based on a strong desire to achieve safety for its own sake, not for competitive reasons.

Aluminum Hangar

(McGraw-Hill World News)

London—One of the first hangars in the world to be built of aluminum alloy is going up at London Airport now.

British European Airways will use it, probably to house its Ambassadors, which will start being delivered to the airline in 1952.

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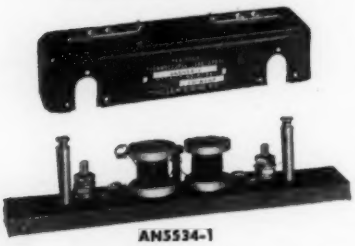
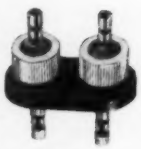


AN5534-1

Developed by Lewis, the AN5534-1 resistor block is used to adjust the overall external resistance of the indicator to eight ohms.



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More Briefs From IAS Sessions

These digests continue AVIATION WEEK's *presentation of subjects discussed at the 19th Annual Meeting of the Institute of the Aeronautical Sciences in New York, Jan.29-Feb. 1. Other summaries appeared last week.*

SUPERSONIC AERODYNAMICS

► **Interrelationship Between Boundary Layer and Base Pressure**—H. H. Kurzweg, Crief, Aeroballistics division, U. S. Naval Ordnance Laboratory, White Oak, Md.

The base drag, usually small compared with the drag of the forebody of blunt-nosed and low-speed bodies, becomes of equal significance with wave drag and surface friction drag for slender, high-speed missiles with sharp pointed noses. Wind-tunnel investigations in a Mach number range 1.5 to 5.0, carried out on cone-cylinder and boat-tailed models showed that the base pressure depends on the energy distribution in the boundary layer. Changes of the velocity and temperature profile of the boundary layer in these tests resulted in base-pressure variations of more than 50 percent, which creates, for the design engineers, the uncertainty of several hundred pounds in the energy balance as it relates to the design of a large guided missile.

The investigations further showed the close connection of the base-pressure problem with other viscous effects—the surface friction and heat transfer. Therefore, it appears that theoretical approaches to calculate base pressure must be made using the characteristic properties of the boundary layer.

HYPERSONIC AERODYNAMICS

► **Similarity Laws for Slender Bodies of Revolution in Hypersonic Flows**—Stanford E. Neice and Dorris M. Ehret, Ames Aeronautical Laboratory, NACA.

A hypersonic similarity law, as developed by Tsien and extended by Hayes, for bodies of revolution at zero angle of attack is tested by comparing pressure distributions obtained using the method of characteristics. The results indicate that, in spite of the assumptions made in its development, the hypersonic similarity law is valid for relatively wide ranges of Mach number and fineness ratio.

Similarity laws for hypersonic flow about slender, pointed bodies of revolution at angle of attack are also developed. Some viscous effects of the transverse component of the flow are considered in this development. Experimental data obtained to date tend to confirm this extension of the law to include bodies of revolution at angle of attack.

It is finally shown that the cases considered are actually special applications of a more general three-dimensional hypersonic similarity law that applies to slender wings and wing-body combinations, as well as bodies of revolution.

► **Summary of Recent Experimental Investigations in the N.O.L. Hypersonic Wind Tunnel**—Peter P. Wegener, Chief, Hyperballistics subdivision III, U. S. Naval Ordnance Laboratory, White Oak, Md.

The N.O.L. 12 by 12-cm. continuous blow-down hypersonic wind tunnel is briefly described. This tunnel can operate up to 60 atmospheres supply pressure and 500 C. supply temperature. A summary of an experimental theoretical investigation of air liquefaction at high Mach numbers is then given. It is shown that dimensionless static pressure and shockwave angle are sensitive indicators of liquefaction effects.

On the other hand, dimensionless pitot pressure, density and velocity are not affected if a fraction of the air in the nozzle is liquefied. Only sufficient pre-heating of the supply air brings these different methods of determining Mach number into agreement.

Preliminary criteria of operating conditions to achieve uniform flow suitable for test purposes are given. Remarks on the aerodynamic charactertistics of simple bodies, boundary layers, diffuser efficiencies, and testing problems in a Mach range from 5 to 10 are included.

► **Exploratory Wind-Tunnel Investigation of Wings and Bodies at M = 6.9**—Charles H. McLellan, Head, 11-Inch Hypersonic Tunnel section, Langley Aeronautical Laboratory, NACA.

Results of an exploratory investigation of wings and bodies at a Mach Number of 6.9 in the Langley 11-in. hypersonic tunnel are presented. Force and pressure-distribution data were obtained on a square and a triangular plan-form wing having 5 per cent thick diamond sections, on a cone-cylinder body of revolution, and on a flat-bottomed or half-cone cylinder body.

Results have been compared with calculations made by various theoretical methods. The more-exact theoretical treatments gave overall force values in good agreement with experimental results. Measured pressure distributions departed appreciably from calculated results; in some cases, this was due to the influence of boundary layer.

► **Recent Investigation of Temperature Recovery and Heat Transmission on Cones and Cylinders in Axial Flow in the NOL Aeroballistics Wind Tunnel**—Gerhard R. Eber, Chief of Thermodynamics subdivision, U. S. Naval Ordnance Laboratory, White Oak, Md.

An investigation of temperatures recovery factors and heat-transfer coefficient was conducted on cones and cylindrical bodies in axial flow in the NOL. Aeroballistics Wind Tunnel at Mach numbers ranging from 1.5 to 5, inclusive. Flow condition encountered in the boundary layer includes laminar, transitional, and turbulent flow.

Resulting temperature recovery factors show good agreement with theory in the laminar-flow region, whereas in turbulent boundary-layer flow, recovery factors increasing with Mach number and higher than indicated by approximate theories were found.

Heat-transfer data were correlated using the Nusselt relation, wherein the physical properties of the air were evaluated for reference temperatures at the inner and outer edge of the boundary layer. A marked effect of wall temperature on boundary-layer transition was observed, which is qualitatively as to be expected from theory.

AEROELASTICITY

▶ **Theoretical Investigation of Several Types of Single Degree of Freedom Flutter**—Harry L. Runyan, Herbert J. Cunningham and Charles E. Watkins, Vibration and Flutter Branch, Dynamics Loads Division, Langley Aeronautical Laboratory, NACA.

The possibility of an undamped oscillation of an airfoil (or aerodynamic body) with a single degree of freedom in potential flow was first noted by Glauert in 1929, but it has received relatively little attention until recently. These undamped oscillations might have a direct bearing on problems of both "dynamic stability" and "flutter" of airplanes. Because of the many configurations of airplane design now being considered and because of the wide operational ranges of speed and altitude, knowledge of this single degree phenomenon becomes more significant.

This paper gives theoretically predicted effects of several primary parameters associated with single degree of freedom flutter. Specific problems dealt with are: Pitching oscillation of an unswept wing, oscillation of an aileron about its hinge axis, and bending oscillation of a swept wing, all in subsonic streams; pitching of an unswept rectangular wing, pitching of a delta or triangular wing, and oscillations of an aileron about its hinge line, all in supersonic streams.

Results are included for one series of experiments which confirm the existence of single degree of freedom pitching flutter of an unswept wing at low speeds.

▶ **Investigation of Flight Flutter Testing Techniques**—Martin D. Schwartz, Senior Engineer, and Donald L. Wrisley, Engineer, Aero-Elastic and Structures Research, Department of Aeronautical Engineering, Massachusetts Institute of Technology.

As the concern over the flutter problem in current designs increases, one sees that high-quality flight-test information would be a valuable aid in predicting flutter speed with greater certainty. Such testing must of necessity be in the speed range below flutter and would be employed in correlation with theoretical calculations.

Since past attempts to collect subcritical aeroelastic response data have been largely unsuccessful, a survey was made to determine the failings of the techniques employed. The survey indicated that greater excitation was required to provide response signals larger than the signal from random aerodynamic and electrical disturbances.

A wind-tunnel program was instituted to determine the practicability of proposed improvements in technique by applying them to a typical model wing. Two excitation methods were selected for development. Sinusoidal responses of suitable magnitude were obtained by installing large rotating unbalances in tip tanks; also, acceptable response amplitudes were provided by externally applied force pulses.

The investigation demonstrated that either technique is practical for in-flight excitation. From the numerical results, the magnitude of excitation required to produce satisfactory amplitudes on current aircraft types is estimated. Relative merits of each method under varying circumstances are discussed in the light of test results.

▶ **Determination of Elastic Wing Aerodynamic Characteristics**—William J. Gaugh and Joseph K. Slap, Aerodynamicists, Northrop Aircraft, Inc.

By successively reapplying the change in elastic wing air loading, a rapidly converging series has been developed for the final air load or angle-of-attack distribution as a function of the dynamic pressure. The value of the divergence dynamic pressure is dependent upon the limiting ratio of the spanwise variation in two successive adjustments.

As the free-stream dynamic pressure approaches the absolute value of this divergence dynamic pressure, the series tends to diverge. This parallels the physical case only for sweptforward and unswept wings. Generally, sweptback wings do not diverge physically; therefore, the radius of convergence of the series was extended.

The algebraic form for a generalized aeroelastic correction factor can be obtained by considering only the first two terms of the series. The two arbitrary constants contained in this simple expression can be determined so as to approximate the aeroelastic effect on the stability derivatives or hinge moments obtained from any aeroelastic solution.

Wind-tunnel data for a full-scale sweptback wing are presented and agree well with calculated results.

ATMOSPHERIC TURBULENCE

▶ **On the Mechanism of Turbulent Momentum, Heat and Water Vapor Transfer in the Atmospheric Surface Layer**—Heinz Lettau, Geophysical Research Directorate, Air Force Cambridge Research Laboratories.

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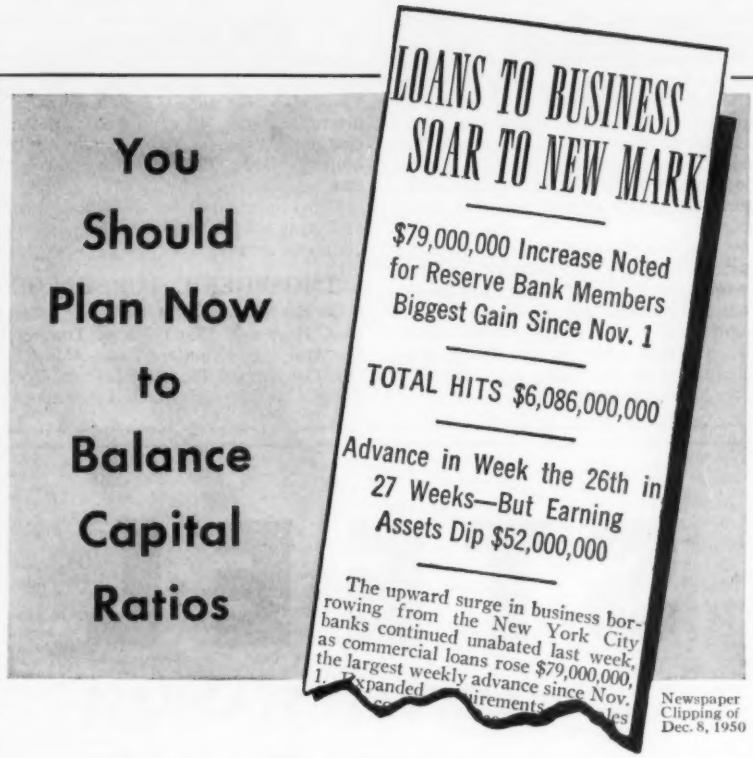
You Should Plan Now to Balance Capital Ratios
LOANS TO BUSINESS SOAR TO NEW MARK
$79,000,000 Increase Noted for Reserve Bank Members Biggest Gain Since Nov. 1
TOTAL HITS $6,086,000,000
Advance in Week the 26th in 27 Weeks—But Earning Assets Dip $52,000,000
The upward surge in business borrowing from the New York City banks continued unabated last week, as commercial loans rose $79,000,000, the largest weekly advance since Nov. 1. Expanded

Newspaper Clipping of Dec. 8, 1950

In the present period of expanding production accompanied by rising costs of material and labor many companies are financing by creating floating debt.

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▶ **Some Measurement of Vertical Diffusion in the Free Atmospheres**—Lester Machta, U. S. Weather Bureau.

The earth exhales radon, a radioactive gas, from both land and water. A steady state is assumed to exist in which the upward diffusion balances the loss due to decay, so that from the vertical distribution of radon one may deduce the coefficient of vertical eddy diffusion. The source of radon is found to be far from ideal for the experiment, but this difficulty is, in part, overcome by averaging the observations.

The resultant distribution of radon with height up to about 30,000 ft. suggests a coefficient of vertical eddy diffusion which is greater than normally observed near the earth's surface. It is argued that the higher value represents the effects of large-scale eddy motions and might be a vertical "Grossaustausch."

▶ **Frequency Distributions of Velocity in a Turbulent Flow**—F. N. Frenkiel, Applied Physics Lab, Johns Hopkins University.

A conventional anemometer used in the atmosphere or in a wind-tunnel measures velocities projected on a plane independently of their directions in the plane. The relation between frequency distribution of those velocities and frequency distribution of turbulent components parallel to the direction of mean velocity is discussed.

At small intensities of the longitudinal turbulence the two distributions are approximately the same. However, at intensities of turbulence of the order of those measured in the atmosphere, the difference between the two frequency distributions becomes appreciable.

Some experimental frequency distributions of wind velocities are presented, and the intensities of atmospheric turbulence are determined from the experiments.

▶ **Special Theory of Turbulence in Shear Flow**—Chan Mou Tchen, Physicist, National Bureau of Standards.

The theory of turbulence in shear flow is useful in studying the properties of a boundary layer. In meteorology, the theory can be used to describe statistically the structure of the small patterns of air motion in the lower atmoshere. An incompressible shear flow with a given mean velocity gradient is considered, and the energy spectrum of the turbulent motion with the method of Fourier-analysis is determined. The equation for the energy spectral function is derived from hydrodynamical equations of turbulent motion. The Kolmogoroff and Heisenberg laws for isotropic turbulence are modified.

▶ **Averaging Processes and Reynolds Equations in Atmospheric Turbulence**—J. Kampé de Fériet, University of Lille, France, and Visiting Professor, University of Maryland.

To fit theoretical properties used in the theory of turbulence, the mean value of a function must satisfy four rules, which the author calls Reynolds' axioms.

In atmospheric turbulence research, the mean value is closely connected with the notion of the scale at which the turbulence is investigated. A definition is suggested for the mean value, expressing theoretically the fact that eddies having smaller diameters than some given bound are discarded.

It is shown that this definition suits three of the Reynolds' axiomes and approximately verifies the fourth.

SO-30 normally has two piston engines as shown, but tests are slated for a jet version.

France Starts Jet Transport Study

SO-30 airframe will carry Nene turbojets as a flying test bed in commercial transport operation studies.

France has embarked on jet transport research. It has taken the airframe of the twin-engine SO-30, a plane whose origin dates back to 1940, and has fitted it with Rolls-Royce-designed Nenes.

This SO-30 Nene, constructed by SNCASO (Societe Nationale de Constructions Aeronautiques du Sud-Ouest) has just been assigned to flight test. Trials probably will be begun early next month.

Playing the role of the French counterpart of the Nene Viking (Britain's pioneer transport jet test bed), the SO-30 Nene seems destined to assume the status of the key craft in the promotion of France's jet transport industry.

As an experimental aircraft, it will be flown as a test bed to probe the problems of commercial jet flights.

▶ **33,000 Ft. Limit**—Operating altitude probably will not go above 33,000 ft. At this height, pressurization will bring the cabin down to 13,100 ft., a level at which an auxiliary oxygen supply will still be needed. Reports indicate that at "slightly under" 33,000 ft., cabin altitude will be 8200 ft.

Studies with the SO-30 Nene will be aimed at developing jet transport operating techniques, but first will come basic studies, under various conditions of the flight regime, of key components and installations, with particular attention paid to effects of a wide range of temperatures.

- **Fuselage,** doors, and control openings will be checked for sealability.
- **Transparent sections** will be subjected to extensive weathering to determine resistance to elements.
- **Electrical equipment** will be observed for altitude effects.
- **Fuel consumption** will be evaluated.
- **Engine intakes** will be checked for operation under icing conditions.
- **New materials** will be evaluated for more effective soundproofing.

▶ **Route Trials**—In addition to these studies, equipment extreme life will be determined and safe operational time limits established. To accomplish this, it is probable that the SO-30 Nene will be placed on a regular service route, or a portion of such route, so that flight conditions will closely simulate those to be encountered in commercial operation.

Another reason for this type of flight plan would be to obtain data which could be compared easily with that from piston-plane runs.

Traffic control procedures and stand-off and diversion limits will be compared, as well as ground-handling operations, passenger loading, and miscellaneous safety considerations.

▶ **Equipment Proving**—Another role seen for the SO-30 Nene is that it could be used to evaluate equipment slated for incorporation in a four-jet transport—the SO-5100 Champagne—under consideration by SNCASO. This type of pretesting would save valuable time in investigation of untried equipment on a new aircraft.

▶ **Fundamental Data**—Basic characteristics and estimated performance of the SO-30 Nene are:

- **Span** ..... 84 ft. 7 in.
- **Length** ..... 61 ft.
- **Wing area** (gross) ..... 910 sq. ft.
- **Gross weight** (with 10,000 lb. of fuel) ..... 39,300 lb.

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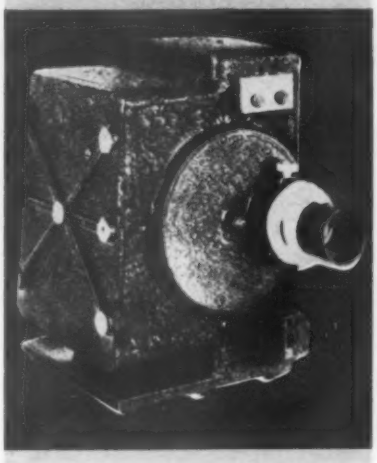

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► **Plane Background**—Choice of the SO-30 airframe already in existence, for fitting with Nenes, for this jet transport research obviously is a matter of expediency but nevertheless appears to be a sound selection. The SO-30 project was begun in 1940 and the first prototype was finished in 1942 as the SO-30N Bellatrix. The craft was disassembled and stored during the German occupation of France, then reassembled and the first flight made in February, 1945.

Two other prototypes were constructed, after which the final configuration was established in 1948 as the SO-30P Bretagne. First flight of this version was in September, 1949.

► **Airline Use**—Encouraged with the results obtained with the Bretagne, SNCASO constructed a cargo version, SO-30C. This flew in January, 1950.

The Bretagne is equipped with two Pratt & Whitney R-2800 B43s or CA18s. First of the Bretagnes went into commercial service in December of 1950 for the Iranian Airways on the Bombay-Teheran-Rome-Paris route. Another craft is on order for this airline.

Two of the planes, bought by Air-Algerie are now undergoing final tests.

And 15 Bretagnes are reported to have been ordered by Air France.

Cooling the Pilot

(*McGraw-Hill World News*)

London—A cool suit for hot pilots has been developed at the Institute of Aviation Medicine, Farnborough, Hampshire, England.

Basic physical principle involved is evaporation cooling—the pilot's own perspiration is evaporated by the slow flow of cooling air next to his skin.

The garment is a one-piece Nylon undersuit worn next to the body. A series of plastic tubes run through the suit to 92 different vents located at points on the body where perspiration is normally secreted.

Atmospheric air, which has been cooled (currently by an ordinary ice-water cooler, later by cockpit refrigeration equipment) is pumped through the tubes and out the vents.

Rate of flow of the air is small—about 12 cfm.—so that the pilot has no sensation of sitting in a draft. Delivery pressure of the air is about 7½ psi.

The same suit could also be used to keep the pilot warm at very high altitudes and low temperatures by connecting the air-lines to the cockpit heating system.

SALES & SERVICE

B-23 Scores As Executive Plane

Ex-bomber picked by corporation as best meeting its specifications after evaluation of several planes.

As defense contracts continue to increase so does the use of corporation aircraft to expedite travel of busy executives between scattered plants and other necessary points. And with the value of aircraft for that purpose undisputed, the major question facing executive plane users is just what type of plane is best for the job.

One consistent plane user, Food Machinery & Chemical Corp., has come up with a study that gives some answers. The firm was faced with the need for a large, long-range plane to add to its Twin-Beech fleet and its evaluation provides some pointers on the desirable specifications of such a type for any manufacturer willing to work on this class of plane.

▶**Wide Territory**—Food Machinery & Chemical Corp.'s home office is at San Jose, Calif.; its numerous factories, divisions, branches and sales offices are spread over 18 different states and Canada, with 13 of them east of the Mississippi. The Twin-Beech was considered fully satisfactory for flying over relatively low terrain with three or four passengers. But to handle speedy cross-country flights with a minimum of delays and re-routing, and with a larger passenger capacity, a new type was felt necessary.

These were the desirable features sought: Increased speed, longer range, better single-engine performance, better high-altitude performance, greater stability and safety in heavy turbulence, and better ratio of power to wing loading to afford more safety in icing conditions and to give good short field landing and takeoff performance.

With these specs in mind, the following types were investigated: Douglas B-23, DC-3 and C-47, Lockheed Lodestar and Ventura and the Grumman Mallard.

▶**B-23 the Choice**—Company officials finally picked the B-23 as best meeting their standards. Some of the factors against the other planes were:

- **Lack of speed** decided against the DC-3 and C-47.
- **Desire for more speed,** better stability and higher ceilings forced out the Lodestar.
- **Licensing restrictions** and inability to operate out of small fields eliminated the Ventura.
- **Desire for more speed** and better high-altitude performance caused the Mallard to be dropped.

In the company's opinion, the B-23 met all the desirable characteristics. Its top speed is 235 mph. and range is eight hours. Single-engine performance with maximum load permits maintaining altitude at 14,000 ft. (providing the desired margin of safety for year-round flying across the Rockies). The plane's wings are stressed for approximately 13Gs and stability is good—favorable factors when flying on instruments in rough weather.

Performance was found to be good at 20,000 ft., and passable up to about 26,000 ft. Oxygen outlets fitted at every seat permit freedom in altitude selection to avoid icing or to pick favorable winds. The Wright 1650-hp. engines combined with high-lift wings were believed not only to give good small field performance, but also to allow carrying wing ice with a greater degree of safety than other twin-engine aircraft.

The B-23 does pose some maintenance problems not affecting the other planes considered. Only a limited number of the airplanes were built, and even fewer made available to civilians. Therefore there is a shortage of parts, and service is not always available. The company has been working closely with other B-23 owners in its area to handle parts and service problems and thus far this has worked out satisfactorily.

Pictorial Computer Helps Pilots Score

Fifteen private pilots and 15 with instrument ratings "flew" 407 navigation problems on a Link trainer without a single failure. The secret: A special pictorial computer (AVIATION WEEK Oct. 23) installed in the Link.

The same pilots then tried the Link using standard needle and pointer instruments, followed omnirange course signals for 439 similar problems but failed to work out 50 of them in the allotted time. Using the pictorial display, every pilot made each turn correctly the first time; with the symbolic display, turns were slower, unnecessary ones were made and pilots showed no rapid improvement even after practice.

The pictorial installation was especially built for the test which was carried out with CAA funds at the University of Illinois. It would not be practical for installation in planes in its present form. But its development contractor, Aero Electronics Co., says a portable unit would cost about $500.

Company Planes Base

A group of eleven Racine, Wis., industrialists have purchased an airport and all its facilities for use as corporation plane facility. All charter services and flying school activities at the field—Horlick-Racine Airport—are being closed, only the headquarters of the Wisconsin Civil Air Patrol will remain.

Reorganized as the Racine Commercial Airport Corp., the installation will be run as a cooperative venture capitalized at $250,000. There are three flight strips, two large and several small hangars, an administration building and restaurant. Further expansion is planned.

SEAPLANE BASE GROWS

One of the more active bases in the East is Lavery's Seaplane Base, Round Lake, N. Y., which is the headquarters for 14 seaplanes and amphibians. The operation has shown a steady growth since it was established in 1937 by the operator, who began with a single Aeronca C-3 on floats and a house trailer. The lake, located between Albany and Saratoga, is 4800 ft. long and 3900 ft. wide.

Huge Savings in Inventory Control

PAA, only partly through long-term program, already has slashed value in half and improved quality of stock.

By Scott H. Reiniger

After months of careful stalking, Pan American World Airways has tackled a profit-clawing inventory and now is shaking it down for all it's worth.

When the working over is completed, PAA inventory is expected to be reduced to a shadow of its former size, with the airline picking up millions of dollars jingled loose from its shelves.

▶ **True All Over**—In cutting inventory down to size, Pan Am has gathered evidence of vital interest to other airlines—evidence indicating its inventory problems are more than likely repeated throughout the aviation industry, affecting airlines in particular. The company has forced inventory to expose in operation its most predatory characteristic—duplication—on a scale that can drain millions of hard-earned dollars out of company coffers.

The evidence: Pan Am has cut 50-60 percent off inventory reviewed so far both in value and in number of items.

To date, the carrier has analyzed about 55,000 of a total of about 110,000 items. It has almost finished boiling down these 55,000 items to a number expected finally to fall between 22–27,000. While larger quantities of the remaining items now are maintained, the slice in inventory value still is in ratio to the slice in number of items, with an original value of $3,000,000 reduced to $1,500,000 (with the job of reducing inventory not half done).

▶ **What Was Done**—Here are a few samples of PAA's inventory reduction:

• **Adhesives and cements**—Reduced from 129 different types to 15 (114 eliminated).

• **Greases**—Reduced from 131 different types to 18 (113 eliminated).

• **Oils**—Reduced from 94 different types to 31 (63 eliminated).

• **Rubber hose**—Reduced from 179 different types to 51 (128 eliminated).

All items retained, or newly-acquired after evaluation to replace materials eliminated, are being standardized on a systemwide basis—throughout the airline's Atlantic, Latin-American and Pacific-Alaska divisions.

▶ **Military Value**—Significantly, Pan Am is going over to an AN part number basis wherever possible in identifying inventory items. Thousands of AN parts, formerly identified under commercial part numbers, now are listed under regular AN designations for purposes of uniformity and to avoid needless stocking of identical items under different part numbers.

Uniformity here means uniformity within the company and uniformity with the Air Force and Navy. The airline feels lining up its inventory where possible on an AN basis will be of "inestimable value" in the event of an international emergency.

In view of the national and international outlook, Pan Am's drastic inventory shakedown is timely. As far as procurement is concerned, the airline is, in effect, clearing its decks for whatever action the near future may bring. It has placed itself at a good vantage point in these respects:

• **A clear, precise picture** of inventory needs is being developed at a time when prices are rising, military needs are tightening availability of equipment, and airlines are demanding more parts for expanding fleets. Pan Am has placed itself in an improved position for closely integrated operations with the military when required.

• **Wasteful duplication** of parts is being eliminated by fully exploiting the versatility of a few items so they function in the place of many items formerly used; by preventing needless stocking of thousands of identical items "hidden" under different part numbers, each stored separately under individual "minimum levels."

• **Higher quality** of items stocked has resulted from careful scrutiny of parts. Often an item previously accepted has been dropped in favor of a new one that does the job better. The aim is maximum effectiveness with a minimum inventory.

• **Fewer items** means fewer priority troubles, less paperwork, less space required, fewer shipment problems, particularly for Pan Am with bases girdling the world. It means a smaller number of different parts can be ordered in greater quantities at lower unit cost.

• **Greatly increased accuracy** in estimating yearly and month-by-month needs has resulted from digging deeply into all phases of procurement and supply, permitting smoother, more economical purchasing activities. Demand for materials, which may fluctuate through the year, is averaged out so "general supply" items can be ordered as much as possible in fixed quantities at fixed periods.

• **Premium annual contracts** can be arranged with suppliers who, knowing the airline's needs over a given period, can more easily schedule production and meet orders. Also, Pan Am can give government agencies handling priorities an accurate estimate of its yearly consumption.

• **Firmer grasp** of the entire field of procurement has resulted from exhaustive research into alternative suppliers and their products. This has turned up the most efficient suppliers from Pan Am's standpoint. And in an emergency, all alternate sources of any item will be known immediately.

▶ **How Much Saved?**—All these points lead to millions of dollars the carrier can expect to save in coming years through standardization, continuing evaluation and rigid policing of inventory. Supply needs and prices are changing. So the main question, the airline explains, is not whether the procurement bill this year, for example, will be less than last year's but how many millions will be saved on the bill this year as a result of standardization?

That doesn't necessarily mean that Pan Am definitely will not have a smaller bill in 1951 than in 1950. The job of reducing inventory is not over, and procurement requirements may change, so an accurate estimate cannot be made.

Henry H. Berke, assistant vice-president in charge of services of supply, told AVIATION WEEK that on the basis of present information "all who are concerned with the project conservatively estimate that on completion of standardization, savings should not represent less than 10 percent of the total procurement bill."

Pan Am has been spending recently about $25 million yearly on procurement, not including gasoline or aircraft. If tied to this figure, and Berke did not do this, the annual savings would be around $2.5 million.

Berke and his associates naturally are restrained in estimating total savings expected from a project not yet completed. A safe bet would be that the estimate of 10 percent has an extremely wide safety margin for error.

Certain evidence gives weight to the possibility of savings representing 20 percent or more of the annual procurement bill, although Pan Am did not imply this.

In addition to the fact Pan Am has been spending annually about $25 million for procurement, two other clues

lead to a conclusion that savings are more likely to approach 20 rather than 10 percent when the program is in full swing. A $1.5 million reduction in inventory value—representing a 50 percent cut in that part studied—already has been realized; and this saving has been made from inventory representing only about 20-30 percent of the value of total inventory.

It's reasonable to presume any savings could at least in part be repeated within a year because of inventory turnover. A 20-percent saving represented in a yearly bill of about $25 million would run around $4-5 million—approaching Pan Am's net profits for 1950.

▶ **Start**—The airline started laying the groundwork for standardization program in 1945. Its first step was to list in one place every item stocked by the three divisions. This task was headed up by Robert Hamilton, system stores manager, services of supply. Hamilton and his counterparts, stores managers in the three divisions, combined inventory data collected from bases pinpointed all over the world into a system catalog—running to twelve fat volumes.

Information gathered in compiling this catalog emphasized what Pan Am already knew—that emergency operations on a worldwide scope under multiple contracts with the armed services during World War II, "making do" with whatever parts could be obtained in a time of critical shortages, followed by fast conversion to peace-time operations had created an inventory that "required drastic unscrambling."

"Unscrambling" is being expedited by a five-man System Standardization Committee, assisted by various groups in the three divisions who are experts on the items under scrutiny. The committee now is staffed by Pan Am's chief chemist, J. T. Hendren, chairman; Robert Hamilton, vice chairman; W. J. Murray, standards engineer, Atlantic division; Ralph Dobbin, standards engineer, Latin American division; and Robert M. Barr, standards supervisor, Pacific-Alaska division.

Formerly, PAA's three divisions exercised autonomy in purchasing equipment for their own needs, but this has been tightened up considerably, and through a monitoring system at Pan Am's central offices in Long Island City, N. Y., it can easily be determined if any division purchasing order does not meet standardization requirements.

▶ **How It Works**—All groups throughout the system are supplied with standards catalogs to guide procurement. New standards are added as necessary, after joint consultations of the three divisions. If the divisions cannot get together on a part, the Standards Committee chairman is empowered to hand down an arbitrary decision.

He may decide, for example, that all divisions must use the same part or, if there is sufficient cause, permit one of them to deviate. If a division is not satisfied, it may appeal to Franklin Gledhill, Pan Am's executive vice president.

Items under study are broken into nine general inventory classifications, split into two major groups. Items in the first six inventory classifications are designated "FESPA" (flight equipment spare parts and accessories). This group numbers approximately 55,000 units and is valued at 70-80 percent of total inventory. Items in the second major group (catalog classes 7-8-9 covering raw materials, aircraft hardware, and other supplies) number about 55,000 also and are valued at 20-30 percent of total inventory.

It is this part of the inventory that has been reduced from a value of about $3,000,000 to $1,500,000. A report on standardization efforts in the "FESPA" group, which are more difficult and will take longer, is expected soon.

Evidence that substantial savings are expected in this group is carried in a statement by Pan Am that "the committee is fairly certain literally thousands of items currently carried in classes 1 through 6 may be in classes 7-8-9, but cannot be recognized as such due to difference in manufacturer's part numbers."

High Altitude Unit Pressurizes Radar

An air compressor, designed for positive operation at 50,000 ft. altitude principally in pressurizing aircraft radar installations with dry, oil-free air, has been developed by the Romec division of Lear, Inc., Elyria, Ohio.

The pump, tagged Type HD-70/U by the Air Force, will deliver in rarefied atmosphere at 50,000 ft., a minimum of 80 cu. in./min. of air while maintaining 32 in. Hg. absolute pressure. At sea level it has a capacity of 1750 cu. in./min., Romec says.

The firm asserts positive starting and pumping at −87 F. is assured through use of self-lubricating "Graphitar" (carbon-graphite composition) sliding blades. The rotary pump is rated for a service life of 1000 hr. with no decrease in performance, and has a duty cycle of 15 min. out of every hour with occasional 30-min. periods of operation permissible.

The 5.1-lb. air compressor is powered by a ¼-hp. motor, a 115v. a.c., 400c., single-phase type, drawing 4 amps. and operating at 7200 rpm. Only ball bearings are lubricated and no maintenance lubrication is required.

First U.S. turbine transport a reality through private enterprise—initiative and Turbo-Prop power by

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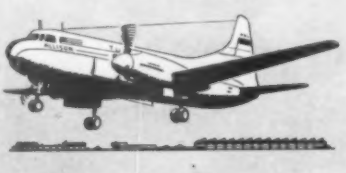

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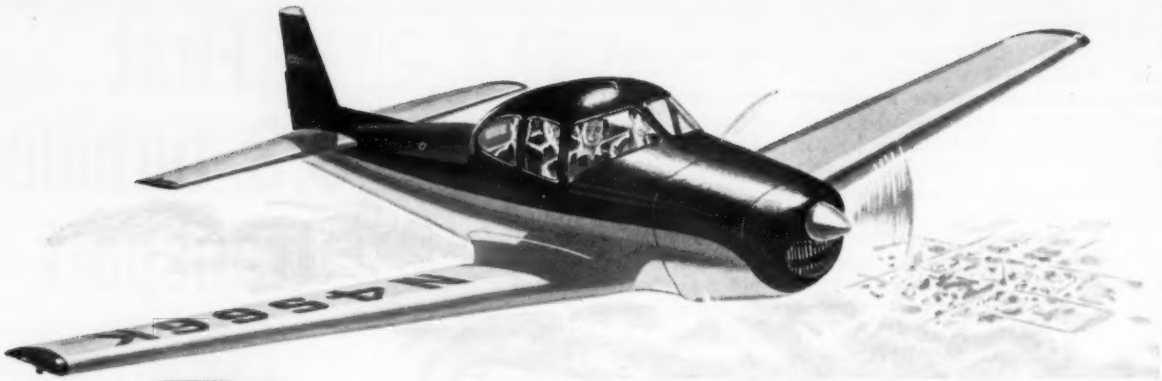


Navion NEWSHEET

'51 SUPER NAVIONS SOLD OUT!

In 27 years of building and selling aircraft, we've never known a greater demand for Ryan planes. The entire production of the better-than-ever '51 Super Navions is sold out in advance. Hundreds more would be needed to satisfy the market demand.

PRODUCTION SCHEDULES

Due to an increase in high-priority military work, 1951 Navion production is being limited to about one-third of the number originally scheduled. As soon as the critical international situation will permit, Ryan will resume full-scale production of Navions for the civilian market.

SERVICE, PARTS AND USED PLANES

While civilian Navion production is curtailed, Ryan Customer Service and Spare Parts activities will be in full operation. In addition to service and parts, Ryan Navion distributors will continue to offer the best in reconditioned, modernized Navions for purchase or charter.

RYAN'S ROLE IN NATIONAL DEFENSE

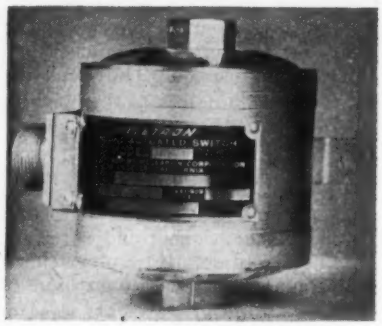
Ryan makes many vital military items including Ryan-developed jet-propelled pilotless planes, huge fuselage sections, special-type fuel tanks, control surfaces and other major airframe components, as well as stainless steel parts and assemblies for jet, rocket and piston type engines. Ryan is also doing design and development work on many important advance-type engineering projects.

Ryan Navion

RYAN AERONAUTICAL COMPANY

402 LINDBERGH FIELD, SAN DIEGO, CALIFORNIA

NEW AVIATION PRODUCTS



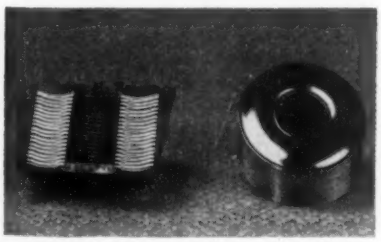
Controls Fuel Flow

A pressure switch developed and produced by the Meletron Corp. now is being used to control automatic selection of fuel tanks in the Northrop F-89 Scorpion, according to the maker.

Recent qualification tests, says the company, show the switch to be extremely rugged, resistant to high frequency vibrations, yet sensitive to a high degree. It meets AMC environmental and qualification requirements and is of explosion-proof construction in accordance with USAF Specification 41065-B, adds the firm.

Other applications of the switch include installation across fuel filters to control alcohol de-icer pumps, fuel tank pressurization control and use in jet engine fuel control systems.

Meletron has designed and is manufacturing a variety of pressure actuated switches for use with water, alcohol, gasoline, hydraulic fluids, liquid oxygen and acids. Address: 950 N. Highland Ave., Los Angeles, Calif.



Bellows for Aircraft

Flexible, welded diaphragm bellows, designed for high pressure use in valves, for shaft sealing and for applications in equipment handling high temperatures, gases or corrosive liquids have been developed by Breeze Corp., Inc.

The units have arc-shaped convolutions and, according to Breeze, can withstand constant pressure strain without distortion. They are engineered to meet specific needs and to equal the operating life cycle of any equipment in which they are used.

Some typical applications:

- **Seals for torque tube** drives in jet engines and rocket motors.
- **Couplings to accommodate** high frequency vibration in aircraft exhausts.

Breeze bellows are made in various sizes and gauges in stainless steel, Inconel, Monel, nickel, steel and other weldable alloys. They can be supplied with fittings to any specifications. Address: 41 S. Sixth St., Newark, N. J.

Relay for Missiles

A tiny relay weighing less than one-third of an ounce has been developed by Hufco Industries.

The unit is designed for use in aircraft and guided missiles according to the company. It has a dynamically balanced armature which reportedly provides high resistance to vibrations, shock and sudden changes in acceleration. Designated Model 1001, it is a single-pole double-throw type and operates on 28v. dc. Contacts are rated for one ampere non-inductive load. Address: 2315 W. Olive St., Burbank, Calif.

Research Craft Motor

An explosion-proof motor "designed as an emergency stand-by unit on a supersonic research aircraft," has been developed by Electrical Engineering and Mfg. Co.

The motor will operate in an ambient temperature of 70C. Motor windings are insulated and high temperature materials are used throughout, says the maker. Duty cycle is 1 min. at 1 hp., 30 sec. at 2¼ hp., continuous. Entire assembly, including gear box, weighs 22½ lb.

EEMCO also is marketing a direct-drive, high-speed hydraulic-pump motor designed for operation at 7200 rpm. The unit drives the pump impeller directly through an internal spline coupling within the armature shaft. This design, the company points out, eliminates reduction gears between motor and pump thereby increasing overall efficiency and reducing size of assembly. Address: 4612 W. Jefferson Blvd., Los Angeles.

New Airline Seat

A new type of airline seat which adjusts simultaneously with the shifting of the passenger's weight has been developed by Jesse B. Bennett, assistant to the president of Braniff International Airways. The seat framework is of tubular configuration and the body rest is of lattice design tied together with springs. Also featured are a built-in headrest that can be folded back and a built-in footrest.

The seat is constructed to absorb turbulence shock. It can be used as a sleeperette fitting in the standard airline seat space. Mr. Bennett has been displaying his invention to military and civil aviation agency engineers and to airline officials.

ALSO ON THE MARKET

Weatherproof cluster lights for anti-sabotage lighting and other industrial area floodlighting applications are mounted on removable box which will accommodate one to five lampholders. Made by Stone Mfg. Co., Elizabeth, N. J.

Vacuum test chamber complete with pump and direct reading altitude gage is designed to test aircraft components at any low pressure point up to the equivalent of 60,000 ft. Made by Tenny Engineering Co.

Kem-Kloth, chemically treated lintless cloth in one operation both cleans and protects glasses and goggles from fogging and steaming. Made by Carol Products 368 E. 45 St., Brooklyn 3.

"Sure-grip" holder can be mounted on wall or in aircraft to hold reports, memos, maps, charts, etc. Device has smooth-working clip with rubber roller that will not mark or crease. Made by The Stanley Works, New Britain, Conn.

Flexible couplings for equipment driven by electric motors rated up to ½ hp. are designed to reduce operating noise, absorb torsional shaft vibration and accommodate shaft misalignments of as much as 2 deg. angular and ⅛ in. parallel. Made by Lord Mfg. Co., Erie, Pa.

Avionics Navigation Work Spurred

Mobilization step-up speeds development of present and new all-weather aid equipment projects.

The mobilization step-up of equipment development for early production means Air Navigation Development Board will soon sponsor several new avionic development contracts. And progress on many present development projects, already moving faster than originally planned, will be sped even more.

Among the all-weather equipments ANDB is pushing now are:

• **Miniature airborne DME.** No lightplane or fighter plane-type distance measuring equipment is built yet, but VOR gear for both is already operating.

• **Airborne transponder** (the R-theta) has been hurried more than any other development recently, but testing of the complete development model, previously set for March-April, is delayed because Air Force changed the band specification. Production contracts may be let based on tests of the model almost completed prior to band specification change.

• **ILS and PAR evaluation.** Present production models of ILS and precision approach radar are undergoing extensive tests to tie down the exact degree of accuracy of each, under selected conditions.

• **Automatic precision** approach radar development has reached the point now where a typical airborne cross-pointer of the ILS type will be used this spring on PAR approaches, just the way the pilot uses ILS. The question for the testers is:

How far can an airplane go using PAR instead of, or along with, ILS on approach? First model will be installed this month at All-Weather Flying division, Wright Field. Originally sponsored by Watson Laboratories, it is now an ANDB project. Development contractor is Gilfillan Bros.

• **1000mc. and 5000mc. omnirange.** The 5000-megacycle development model of omnirange by Sperry Gyroscope has passed its acceptance test and is ready for evaluation at All-Weather. The 1000mc. development model of Federal Telecommunications Laboratories is ready for acceptance test now by Watson Laboratories, the original sponsor. (Present omniranges are 100mc. band.)

• **Two new ILS antenna** systems. The two ILS developments aimed at ridding the system of terrain reflections that bend the localizer beam are almost ready for Air Force evaluation before procurement decision. The CAA has tried to lick the problem, as Air Force tried earlier, by use of a parabolic reflector, to narrow the beam and force it all in the one direction. The Air Force development of broadside, or in-line, antennas concentrates the beam by phase reinforcement and offsetting. Air Force future ILS procurement evaluation awaits final comparison of this type of development and the CAA-developed parabolic technique.

• **1000mc. and 5000mc. ILS.** The experimental development model of 1000-mc. ILS by Federal Telecommunications Laboratories has been accepted and taken over by the Air Force; it now awaits evaluation at Wright Field. The 5000mc. ILS of Sperry will be ready to undergo acceptance tests by midyear.

• **Traffic control aid.** ANDB plans to let development contracts within a year for pictorial traffic control display. This will be a flat map on which mechanical markers automatically move across the map on the course and speed cranked into a mechanical posting board by the traffic controller when he gets position reports. Each traffic control center with such a display would be able to take over control without the present need for phone calls. On passing over control, ATC No. Five would merely push a button on his mechanical posting board and the information would turn up on the same board of ATC No. Six. The posting board will carry all pertinent data. The pictorial traffic control display map carries identity, position and altitude.

In the ultimate program, radar will activate the automatic display markers, and the markers themselves may be electronic pips instead of mechanical bugs.

The traffic control project of ANDB is still in the requirements research stage because interpretation of requirements is subject to considerable controversy now. ANDB has devised a simulated traffic problems practice gadget to work out the problems in laboratory form, eliminating all but the most promising solutions before undertaking flight tests.

• **Automatic landing flare-out altimeter.** The Air Force development of automatic landing flare-out by airborne altimeter will start tests at Wright Field soon. Present thinking calls for this to take over glide path control from the ILS at about 50-100-ft. altitude.

The Air Navigation Development

PUSH-BUTTON FLIGHT INFORMATION

Push a button and information on any Trans-Canada Air Lines' flight out of Toronto lights up on the screen. This novel device is being used extensively by air travelers to get information quickly on number of daily flights, fares, flying time and air miles to any of the airlines' stops in the U. S. and Canada. By pressing a button naming the terminal, electrical contact is made giving the desired data.

Board wants quick development of two types of small DME:

• **A miniature, high-quality** version of the standard gear now set for large transport and military planes.

• **A "tin can" version** for private planes —that is a cheap, small, simple DME without the fancy frills.

The development of both types of small DME would probably follow the pattern of small VOR sets. The two miniature Air Force-Navy versions of VOR are the ARN-19 of Collins Radio and the ARN-24 of Federal, both of which are high-performance sets. Then there are the existing lightplane VOR sets of Narco, Lear, Stock, Mitchell, among others, which serve the private flying field.

For similar development of small DME sets, ANDB would probably get CAA to sponsor development contracts for both types—perhaps two contractors for each type.

The small-plane DME gear will probably have manual tuning, manual search and voltmeter presentation of distance instead of feeder-counter.

Greater Use Seen of Flying Ambulances

A recent medical study of 14,000 patients moved by Military Air Transport Service points toward a growing peacetime as well as wartime market for airlines.

The study shows that almost all patients may be moved by air transport. "Today," the reporting doctors note, "much of the available expert specialized medical care is concentrated in medical centers. In many instances patients requiring specialized care must be transported to such a center. . . . In general, the routes, altitudes, weather conditions and types of aircraft utilized (by MATS) were identical with conditions of commercial airline operations."

One-third of the patients considered were stretcher cases. This brings up the one problem airlines must lick to open up the lucrative large-scale travel by the sick in this country to specialist doctors and medical centers. That problem is isolation of the sick in a passenger plane. A suggested solution is to use cargo planes.

The recently developed equipment used by MATS to fly casualties efficiently and comfortably is quickly installed in or taken out of a plane. Thus, a few fittings installed in airline cargo planes would make them capable of transporting patients in addition to cargo.

Mixed cargo and patient loads should offer little problem, as isolation from healthy passenger loads is what the patient requires most.

The study of MATS cases showed that only seven percent of the case reports recorded symptoms of any kind during flight. Most symptoms were due to effects of motion, altitude or the disease itself. They were minor symptoms and not a single ill after-effect was reported. Simple treatment relieved the symptoms in 97 percent of the cases. Most frequently, the patient was merely asked to lie down. Only one percent received medication. This consisted of such simple remedies as aspirin and sea-sick pills.

Less than one percent of the patients were rejected for air evacuation. On this matter of patient adaptability for air transport, the doctors' report has this to say:

"The effects of air travel on certain diseases and injuries must be viewed critically and each case considered individually. The effects of ascent to altitude . . . may have profound effect on certain pathological conditions."

The report was prepared by Col. B. A. Strickland, Jr., USAF Medical Corps, and Dr. James A. Rafferty, Randolph Field, Tex. It appeared in the Jan. 20 Journal of the American Medical Assn.

CAB Urges Fare Hikes On Coast Coach Runs

Civil Aeronautics Board has "urged" all airlines offering coach service on the San Francisco-Los Angeles run to raise coach fares from the present $9.95, or 3 cents a mile, to $11.70, or just over 3½ cents a mile. This may be the tip-off to a later industry-wide boost in air coach tariffs.

The Board gives as its reason the recent increases in operating costs. On almost all other scheduled coach routes in the U. S., coach fares are now 4½ cents a mile, raised to that by CAB from 4 cents last fall.

The Board stated the reason as follows: "During the past year and the early part of this year, costs have risen to a point where . . . the proposed increase would be required if these operations are to continue on an economically sound basis."

United Air Lines has already answered CAB by raising its coach fare between Los Angeles and San Francisco to $11.70 "in line with findings of the CAB."

Other airlines giving scheduled service on that run are Western Air Lines, California Central Air Lines and Pacific Southwest Air Lines. The latter two are intrastate carriers, and therefore will be less influenced by the CAB's recommendation than by their own views of the competitive situation.

CAB urged that rates be raised by Mar. 1. United has already announced it will comply.

NWA Reorganizes Operations Setup

In a shakeup of its top operations, inspections and maintenance personnel, Northwest Airlines last week moved to tighten up its organization, presumably as a result of its operational record of recent months.

President Croil Hunter has made the following key operations changes:

• K. R. Ferguson, who has been vice-president for operations and engineering, has been replaced by Frank R. Judd, formerly western region vice-president.

• M. B. Freeburg, who has been operations executive, has been removed from that post and his duties combined with those of Dudley S. Cox, manager of flight operations.

• Ralph E. Geror, manager of mechanical operations, has been relieved and his duties taken over by E. B. Curry, general superintendent of aircraft maintenance.

• D. B. Benham, chief inspector, will be assigned to report directly to Judd.

Reliable Washington sources said that the changes made by Hunter followed a series of conferences between top CAA and CAB officials and Northwest Airlines in regard to the recent operations difficulties of the airline, including accidents and some incidents in which there were no serious aircraft damage or injuries.

It was understood that the personnel changes were made by Northwest management, without specific recommendations by the government conferees, except one that the company separate its inspection setup from its maintenance organization more completely than it had been.

Brazil's New Rule

The Brazilian Air Ministry has issued a novel regulation defining whether or not to grant air routes licenses to applicants.

All new licenses will be issued for a six-month provisional period. If the newly licensed carrier does in the second three months less than half the business he did in the first three, he loses his license.

MATS Pacific Lift Utilization High

The Pacific division of Military Air Transport Service logged more than 10,000 hours of transport flying time in November.

The division came within 5 percent of its theoretical "target of perfection" for reducing turn-around time and raising utilization. "Perfection" is de-

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The Wittek Type WWD Aviation HOSE CLAMP

Available in all standard aircraft sizes, the WWD is also furnished in large diameters up to 12" for duct and other special applications. Permits easy installation when hose is in place.

Meet current AN specifications and have C.A.A. approval.

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fined as exact performance of the programmed flying hours.

Turn-around times for C-54s and C-97s of the MATS Pacific division at Haneda Air Base, Tokyo, have dropped steadily, MATS reports.

The C-54s of the Troop Carrier Command have also showed improvement, says MATS. The troop carrier planes require more maintenance due to the long flights from the U. S. to Japan, whereas the MATS planes operate from Hickam Field.

CAA Announces Airport Program

CAA's latest National Airport Plan sets civil airport improvement needs of the U. S. and territories at $928,033,000 for 5093 airports for the three-year period—calendar 1951-1953. This includes work on 2777 airports not yet built and additional work on 2316 already built.

The new National Airport Plan (as of Dec. 30, 1950) sets civil airport needs at about $309 million a year. But only about $40 million may be spent for civil airports in the coming year, if Budget Bureau recommendations are followed. This compares with a previous rate of about $90 million annually.

Reason for the big cut in civil airport improvements is the whopping new military airport program, which may run around $500 million in fiscal 1952, compared with almost nothing spent since World War II's end.

But the big hole in civil airport progress will be partly filled by the military construction. Figuring a long-term civil usefulness factor of 25 percent for military bases, the military this year may contribute about $125 million directly applicable to the National Airport Plan quota. So the combined total of about $165 million annual construction useful to civil airport planning will equal about half the $309 million called for by CAA.

The National Airport Plan outlines "needs," as analyzed by the CAA Office of Airports.

If the plan were followed through, the local sponsors would put up $483,345,000 and the federal government would put up $445,688,000.

The plan for the next three years includes 66 heliports, 312 seaports, 575 large airports (Class 4 and larger), and 4140 small airports (Classes 1, 2, 3).

Work needed on large airports is estimated at $448,200,000; the small airports need $467,000,000. Thus, 48 percent of the money is needed for the 575 largest airports, 50 percent for about 4000 small airports, and 2 percent for the approximately 400 seaplane bases and heliports.

ATA Supports WAL On Mail Pay Appeal

Air Transport Assn. has asked the Civil Aeronautics Board for permission to intervene on behalf of Western Air Lines. Western is contesting CAB's decision that the $1,099,000 profit on sale of its Los Angeles-Denver route is revenue offsetting the need for mail compensation already paid.

CAB says in effect that since the government gave the airline the route, the airline must give back to the government the profit from sale of it.

Crucial words in the Civil Aeronautics Act are the following in Section 406 (b): The authority "in fixing . . . fair and reasonable rates of compensation . . . shall consider . . . the need of the air carrier . . . for compensation sufficient to ensure performance (of the service) . . . and, together with all other revenue of the air carrier . . . to enable such air carrier under . . . efficient management to continue the development of air transportation. . . ."

CAB figures that the "all other revenue" mentioned in Section 406 includes the profit from sale of a route.

ATA is alarmed over the precedent by which CAB would make retroactive claims of overpayment of mail pay when an airline realizes a profit on sale of a route or capital asset.

The Post Office has countered ATA's petition to intervene in the oral argument requested by Western. The PO says ATA is not only too late but has no direct interest in the case.

The Board did not rely on any past precedent in issuing the show-cause order to Western setting mail pay rates, including reduction of 1947 pay $747,681. Little earlier precedent is available. For instance, the American Overseas Airlines sale to Pan American World Airways was at book value, so the problem of profit on route sale did not arise.

Capital Rings Bell on N.Y.-Atlanta Run

Capital Airlines' new Atlanta-New York nonstop Constellation service had about a 50-percent load factor the first two weeks of operation and is proving formidable new competition for Eastern Air Lines. This new service also bears on Delta Air Lines' application to merge with Northeast Airlines and obtain a New York-Atlanta route from Civil Aeronautics Board.

Until Jan. 10, Eastern was the only airline operating Atlanta-New York nonstop. Eastern uses 60-passenger Constellations. Eastern now is up against Capital's more de luxe service.

actively promoted, using a 50-passenger-seating-density Constellation that has a lounge forward, complete with potted plants and caged lovebirds.

Capital got CAB approval of Atlanta-New York nonstop service three years ago. But Capital didn't use it then because financial problems required pruning rather than sprouting new routes. Almost everyone but Eastern forgot Capital still had the option of opening the service.

Delta Air Lines made application last summer to CAB for merger with Northeast and a New York-Atlanta route extension. A prime Delta point was the need for a link between the South and the Northeast, via a New York-Atlanta route.

Capital's whirlwind promotion and inauguration of the service last month puts a new face on southern service to the north.

Says a Capital officer: "This route puts our airline on Main Street."

Hawaiian Scheduled Air Travel Hits High

Scheduled airline travel in Hawaii hit a new high of 427,404 passengers in 1950 and the inter-island 21-year perfect safety record stayed intact.

Total travel in 1949 was 361,062 passengers.

Hawaiian Airlines Ltd., 21-year-old veteran of island flying, carried 333,625 passengers while its new competitor, which now calls itself TPA—The Aloha Airline, carried 93,879 in its first full year.

Both were up from 1949 when Aloha had 56,374 in seven months and Hawaiian 304,688 for the year. But Aloha was still struggling along in the red, hoping for a U. S. mail subsidy to bolster it.

Capital Buys Two KLM 749A Connies

Continuing its cash-on-the barrelhead policy, Capital Airlines has bought two Lockheed Constellation L-749As for delivery January, 1952. Eastern Air Lines is negotiating to buy five more of the same.

These are seven Connies KLM Royal Dutch Airlines is trading in to Lockheed Aircraft Co. for the bigger Super Constellation L-1049s.

Lockheed will modify the L-749 interiors for Capital to about the same luxury layout as the five L-049s Capital already operates. (Those were also originally KLM planes bought by Capital last year on a lease-purchase deal.)

Capital sources say the company would probably not have bought any new planes this year, but it figured these are all that are likely to appear on the market for some time.

The company is making downpayment on the two L-749As now, will make some further payments this year, and final payment in full on delivery next January. The company will need no new financing to pay for the planes, under normal business conditions.

TAL Will Fly Navy Catalinas in Pacific

Transocean Air Lines—low bidder among 12—has been picked by the Navy to supply air service for the U. S. Pacific trust territories.

Transocean will use four Navy-furnished amphibious PBY Catalinas, supplying its own crews. The planes will make the round of the former Japanese-mandated islands once a week for 15 months. Total estimated service in that period will come to 400,000 plane miles. Passengers, cargo and mail will go by Transocean's new service from Guam.

The Navy wants private airline operation, if the service can be supplied cheaper that way. Contract terms have not been announced yet.

Tahiti-Hawaii Run Proves Feasible

Tahiti-Hawaii Airways has made its first DC-4 exploratory flight to Tahiti using a chartered Transocean Air Lines plane. With the flight a success, THA plans to run a monthly schedule—the first on about Feb. 20, from Honolulu.

Time on the first DC-4 run was 36 hours roundtrip Tahiti-Hawaii, via Canton. French officials at Tahiti sent mail for all stops on the return trip.

The new route goes first to Canton Island, then turns southeasterly to an area in which, according to Transocean's reports, no commercial airliner has ever flown. This part of the flight ends at Bora Bora, French Society Islands, on a World War II airstrip. Last hop may go to Tahiti via amphibious plane. The complete route is about 5000 miles each way.

Ozark Starts Service St. Louis to Tulsa

Ozark Air Lines last week started operating its St. Louis-Tulsa route segment, via Springfield and Joplin, Mo. This brings Ozark's present service to 23 cities in eight midwestern states, with chief stops at St. Louis, Memphis, Chicago, Indianapolis, Tulsa and Kansas City.

The St. Louis-Tulsa route is Ozark's sixth to be activated. Jefferson City,

Allison powers first flight of first U. S. Turbo-Prop transport

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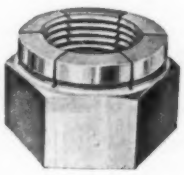

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Mo., and Miami, Okla., are left off the route now, as their airports do not come up to transport requirements, Ozark states.

Ozark operates only DC-3 aircraft.

The carrier is negotiating to have American Airlines handle its ground operations at Joplin, Tulsa, and Springfield.

The new segment will be served by four flights daily—two arrivals, two departures.

SHORTLINES

► **Air Express**—December air express revenues in the New York area totaled $724,402, just one percent under the record December of 1946, and 24 percent over a year ago. Number of shipments—150,243—was up 5 percent over December 1949. Average weight per shipment rose steadily in 1950, from 19.5 lb. in January to 27.2 lb. in December. Total 1950 weight in 1950 was 28 million lb. up 14 percent. Seasonal pattern was distorted in the second half by the Korean war, which caused a surge starting in August.

► **Air France**—Carrier transported 23,000 passengers and one million lb. freight over the Atlantic in 1950. Company converted all its flights to 32-passenger capacity in the year, giving 30 percent more "stretch room" to each passenger . . . . Company expects higher traffic, both passenger and cargo, this year and plans to add more flights.

► **All-American Airways**—Feeder claims its percentage increase in passenger, mail, and express traffic 1949-50 was greatest of all scheduled domestic lines. The 153,318 passengers carried was 105 percent over 1949. Passenger miles rose 115 percent to 21,200,000. December passengers carried numbered 10,547. AAA figures for 1949 include March-December only.

► **American Airlines**—Mail pay was only 5.1 percent of total income in 1950. Mail pay was $6,077,000 and income came to $11.4 million. American's average annual return on $100 million invested, for the five years 1946-50, is 2.25 percent. Gross revenue for 1950 exceeds $119 million, with earnings over $1.30 a share, the company estimates.

► **British Overseas Airways**—BOAC says its 049 Constellation fleet has averaged 6 hr. 3 min. daily utilization for 4½ years. Including the grounding July 12-Aug. 18, 1946, daily utilization the first 13 months of service was 8 hr. Optimum use was in spring and summer,

1948—nine Connies on trans-Atlantic services averaged for six months 8 hr., 25 min. The Connies went to London-South America routes via the Caribbean in 1950 when Stratocruisers were put on the North Atlantic.

▶ **Canadian Transport Dept.**—Department has granted $250,000 as subsidy to the Royal Canadian Flying Clubs for training private pilots in 1951.

▶ **Mid-Continent Airlines**—Company's unaudited financial report shows net profit for 1950 of $352,005, or 84½ cents a common share. This compares with 1949's $340,024, or 84.7 cents a share then outstanding. Operating revenues of $8,238,391 are up 10 percent over 1949. Passenger miles, 106,445,570, compare with 1949's 100,237,882. Operating expenses are up 8 percent to $7,560,549, partly because of Convair service started the last seven months of the year, and the new Sioux City-Chicago-Milwaukee service started Sept. 26.

▶ **Pacific Northern Airlines**—Alaska line's passenger miles gained 19 percent to 10,639,000 in 1950, with number of passengers up 24 percent to 25,862. Cargo ton miles gained 75 percent to 291,179. Load figure, in revenue ton miles used, was 55 percent in 1950, 49 percent in 1949.

▶ **Pan American World Airways**—Company is negotiating standby contracts or commitments to aid the Defense Dept. in establishing and operating possible future trans-ocean and trans-Asian airways. PanAm built and operated the vital military North African and other air routes of World War II. . . . Company has added a third weekly roundtrip flight San Juan-Port of Spain, Trinidad, for heavy winter tourist travel.

▶ **Pioneer Air Lines**—Feeder's 1950 passenger miles gained 34 percent to 37,927,797 in 1950. Pioneer's 99,388 mail ton miles in 1950 was 18 percent of all feeder mail carriage, while the line's mail pay amounted to only about 8 percent of feeder mail pay.

▶ **Trans-Canada Air Lines**—Company plans to start five flights a week, Montreal-Paris via London on Apr. 1. TCA will use DC-4M planes in competition with Air France's Constellations. TCA trip will take 15 hours.

▶ **Trans World Airlines**—Carrier claims it has flown more passengers from the U.S. to continental Western Europe since 1946 than any other airline. Total trans-Atlantic service in five years comes to 9000 scheduled crossings. TWA now serves 20 cities in 17 countries, with these routes connecting to domestic TWA routes serving 60 U.S. cities. TWA now offers 22 trans-Atlantic roundtrips per week.

▶ **United Air Lines**—United has completed 10,000 crossings between California and the Hawaiian Islands in eight years. This includes Air Transport Command flights started in 1942. Company now operates 12 roundtrips weekly, using Stratocruisers. . . . Company has eliminated double baggage checking on U.S.-international interline flights for passengers using United and 15 international air carriers. . . . Company plans to build a 100 x 200-ft. extension to its maintenance and overhaul base at San Francisco. Present base represents a $7-million investment. . . . United carries three passengers to Honolulu for every two carried by Pan American, not counting through passengers to the Orient, UAL estimates show. . . . Company's reserve account for damage to aircraft is maintained at the equivalent of two DC-6s and one Stratocruiser.

▶ **Wisconsin Central Airlines**—Company carried 48,810 passengers in 1950, 50 percent over 1949. Ton miles air mail, 39,580, is up 92 percent, and air express, 48,102 ton miles, is up 116 percent.

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AVIATION CALENDAR

Feb. 12—Louisiana Aviation Conference, seminar on civil defense, Washington-Youree Hotel, Shreveport.

Feb. 14-18—Annual aviation fiesta, Orlando Municipal Airport, Fla.

Feb. 19-20—Meeting covering agricultural research as related to aviation, sponsored by the Flying Farmers of America, Memphis.

Feb. 23—Air Transport Command five-year reunion, Waldorf Astoria Hotel, New York. For information write E. K. Hastings, resident manager of the hotel.

Mar. 8-9—Eastern regional meeting, Institute of Navigation, Shoreham Hotel, Washington, D. C.

Mar. 12-13—Short course on uses of aerial equipment in agriculture. Purdue University, West Lafayette, Ind.

Mar. 16—Sixth annual flight propulsion meeting, Institute of Aeronautical Sciences, Hotel Carter, Cleveland.

Mar. 19-23—Seventh Western Metal Exposition, Oakland Auditorium and Exposition Hall, Oakland, Calif.

Apr. 16-18—Society of Automotive Engineers aeronautic and aircraft engine display, Hotel Statler, New York.

Apr. 19-21—Airport Operators Council annual meeting, Hotel Peabody, Memphis, Tenn.

Apr. 24-26—ATA annual engineering and maintenance conference, Hotel Drake, Chicago.

May 12-13—Airline Medical Directors Assn. eighth annual meeting, Hotel Shirley Savoy, Denver, Colo.

May 13-14—Airline Medical Examiners Assn. fourth annual meeting, Hotel Shirley Savoy, Denver, Colo.

May 14-16—Aero Medical Assn. 22nd annual meeting, Hotel Shirley Savoy, Denver, Colo.

May 17-19—Annual convention of the Women's Aeronautical Assn. of the U. S., Little Rock, Ark.

June 11-15—Second annual conference on industrial research, conducted by Columbia University Dept. of Industrial Engineering, New York.

June 13-16—Aviation Writers Assn., convention, Hotel Commodore, N. Y.

June 15-July 1—International aviation display, Grand Palais and Le Bourget Airport, Paris.

June 18-July 6—Three-week Air Age Institute course, Parks College of Aeronautical Technology of St. Louis University, East St. Louis, Ill.

June 25-29—1951 summer general meeting of the American Institute of Electrical Engineers, Royal York Hotel, Toronto.

Sept. 7-11—Third annual Anglo-American Aeronautical Conference, convened jointly by Royal Aeronautical Society and IAS, Brighton, England.

PICTURE CREDITS

9—(RB-45C-1) Keystone; (C-124A) INP; (Skyraiders) Douglas; 13—BuAer; 15—Wide World; 33—Air Mondial.

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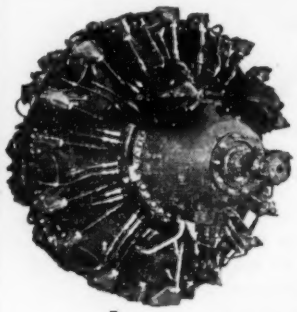

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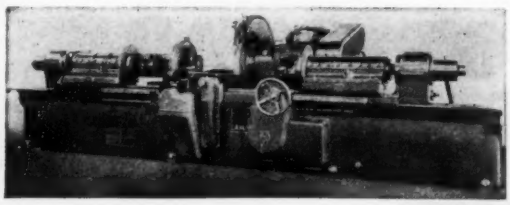

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2174	35787-10	Bushing
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814	35814	Blower Assy.
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15	37993	Housing Stud
28	38314	Rod Assy. Comp
20	45213	Cover
182	46400E	Liner
30	48346	Cylinder
1	48347	Cylinder
1475	48360	Bearing
53	48362	Shaft
175	48363	Shaft
3	48388	Sump
100	48389	Fitting
209	48390	Retainer
56	48392	Sump
533	48447	Bushing
107	48457	Adapter
76	48458	Bushing
390	48461	Gear
149	48468	Bearing
[90	48468B	Bearing
389	48469	Bearing
470	48470	Bearing
75000	51506	Plug
393	54847	Clamp
71	56721	Cover
71	57006	Cover
10	68375	Gear
16	68837	Clamp

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Quantity	Part No.	Description
78	76236	Gear
5	77453	Housing (Reduction)
565	81397	Tube
100	84183	C/Case Assy.
10736	84185	Cover Assy.
261	84235	Pipe
155	84281	Spacers
1351	84282	Adapter
12	84284	Adapter
1178	84289	Bearing
21	84314	Counter Balance
113	84487	Housing
87	84567-B	Stud
77	84591C	Nose Housing
178	84602	Bracket
251	84687	Pinnon
30	84702	Shroud
397	84752	Bearing

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300	DA1F	Dynamotor
7	AS27A/ARN-5	Antenna
7	BC733D	Localizer Receiver
5	R89/ARN-5	Glide Path Receiver
162	3611-B	Interphone Amplifier
35	MR-9B	Control Boxes
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130	2P771A	Pesco Fuel Pump
300	AN4014	Type D3 Wobble Pump
530	564-2	Pioneer Oil Separator
115	P4CA2A	Parker Primer
80	AN3213-1	Scintilla Ignition Switch
2000	AN3096-4	Light Assembly
800	AN3096-5	Light Assembly
380	AN3096-6	Light Assembly
75	EE-709M2	Air Associates Motor Assy.
1500	AN4078-1	(37D6210) Solenoid
490	AN6203-1	(AA14007B) Accumulator

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STRICTLY PERSONAL

DOWN-TO-EARTH DEDUCTION—Our friend **Doktor Von Flugen** reports that CAA's Aircraft Analysis Report No. 51 lists among the various causes of aircraft accidents during the past year the most common one, "collision with ground." The Herr Doktor's chest keeps expanding. The Delta Digest, Aircraft Heating Digest of Surface Combustion Corp., and the Douglas Service magazine, are the latest publications to reprint parts of his glossary of aviation terms, written originally for this column.

* * *

ORDEAL BY APPLICATION—We like **Emily Watson's** piece in the new United Aircraft Bee-Hive. "Straightforward a document as it is, the employment application blank suffers perhaps more misinterpretation and indignities than any other printed form," she writes from down Chance Vought way.

"There was the man who was tripped up on this innocuous inquiry. 'Height: feet —.' The befuddled applicant squirmed in his chair a while, then asked the receptionist for a ruler. Shortly thereafter, he was measuring the height of his feet.

"Now a legend at Chance Vought was the applicant who took her blank home for the struggle, and later invaded the telephone circuits at Chance Vought. 'Here where it say phone,' she demanded of the interviewer, 'does that mean I phones you or you phones me?'

"A number of hopefuls have described their hair as brown, their complexion light and their eyes two.

"And many are perplexed when it comes to putting their marital status in print. One woman checked off all the alternatives, explaining to the interviewer, 'I'se been single and I'se been married. I'se been separated and divorced, and now I'se a widow.'

"One man listed as dependents, 'Six friends.'

"Now nationally famous was the self-confident Vought applicant who listed himself as Jones, Rufus, Otherwise Known as Shot, Hot.

"Vought investigators still are puzzling over where to apply for a birth certificate for the applicant who listed his place of birth as 'a taxicab,' and are looking askance at the application of a 74-year-old man who listed under 'Languages Spoken Besides English,' 'PROFANITY.'

"Vought got little satisfaction from a man who answered:

Previous Type of Work: Hard
Rate of Pay: Low
Reason for Leaving: Quit

"A Gay Blade listed under 'Dates in Service,' 'Girls from Memphis, Tenn., to Hot Springs, Ark.,' and one with sadder memories wrote under 'Branch of Service,' 'Infantry.' And under 'Principal Military Duty,' 'Walking.'

"But perhaps the most poignant story written on an application form was painstakingly filled out as the last words on a blank made out by a second party. 'This is not for me. It is for my brother-in-law. I don't know what he can do. All I have seen him do is eat and sleep.'"

* * *

ANOTHER TYPO—The other night during the Aviation Writers Assn. Washington banquet in the Statler, while CAB's Chairman **Rentzel** was speaking, some of us got a start. Some wag had wheeled in one of the Statler's swank signboards from in front of another private dining room. It said "National Association of Funeral Directors."

* * *

HOW TO BE AN AVIATION WRITER—Boston Traveler's **Bob Sibley**, upon reading that AIA plans to produce a handbook to help young aviation writers, says:

"As a white-haired old aviation writer we have several thoughts: (1) The key word is configuration. Sprinkle it all through your copy and it will have the genuine flavor. (2) Never use the expression, 'flight attitude.' It will come out 'flight altitude' sure as shooting. (3) Never mention a pitot tube. It will appear 'pilot' tube, sure as the same shooting above. (4) Millions of people don't know it, after all these years, but it isn't 'Army Air Forces' any more. Don't say Army plane when you mean Air Force plane. (5) And if you can write 'Mitchel Air Force Base' without having it read 'Mitchell,' you're in."

* * *

INTELLIGENCE REPORT FROM WASHINGTON—Burgeoning bureaucrats in Washington are enjoying the nugget in a recent speech by **Charles O. Cary**, secretary of the Air Coordinating Committee: "In Washington a coordinator has been defined as a mouse training to be a rat."

* * *

RAFFLED NERVES ON THE L.I.R.R.—**Gene Henkel** from out Long Island way writes from Fairchild Engine division that he heard **Sadie the Stewardess** tell a friend "The Long Island Railroad isn't selling tickets anymore. They're selling chances."

* * *

DELAYED WEATHER FORECAST—Flight Engineer **Coonley** of Eastern sent us several system teletypes that went over the lines Christmas eve. It's a little late to reproduce one but we're going to anyhow. "PD 105. ALL STATIONS. SANTA CLAUS SLEIGH REPORTS HEAVY ALCOHOLIC HAZE OVER ALL STATIONS. FORECAST HI SCATTERED WHISKY BOTTLES LOWER BROKEN BEER BOTTLES WITH OCNL EGGNOG FOLLOWED BY MODERATE TO STRONG SCOTCH AND SODA. FURTHER OUTLOOK HEADACHES AND BRACERS BECOMING STRAIGHT SHOTS BY 1200 OTHERWISE LITTLE HOPE FOR RECOVERY. MERRY CHRISTMAS. THE WINDY CITY CHI." —R. H. W.

WHAT'S NEW

New Books

Appearance of **Jane's All the World's Aircraft** has become an annual event that is looked forward to in the industry, and this 41st volume, the 1950-51 edition, edited by Leonard Bridgman, maintains the tradition of being the most comprehensive and best-illustrated aircraft yearbook available.

The new volume is again set in the three-column measure initiated last year and carries several new features, among them a listing of first flights of 63 new aircraft between June 1, 1949 and May 31, 1950. Of these, 33 were powered by gas turbine powerplants. Reflecting renewed interest in lighter-than-air development, the airship section is carried again after a ten-year lapse.

The United States again leads in coverage in Section C (aircraft) with 95 pages and 222 pictures; Britain is second with 84 pages and 189 photos. There are many new three-view drawings.

Published by McGraw-Hill Book Co., Inc., 330 W. 42 St., New York 18. Over 400 pages and 3000 illustrations, price $20.00.

Bid Information

A directory of U. S. government contracts and contractors, for the period July 15 to Nov. 15, 1950, has been published in Washington by U. S. Bid Information, a private company supplying a bid information service to subscribers. The directory lists more than 3200 companies, holding more than 6200 contracts for military needs, valued at more than $1.6 billion.

During the period covered, General Motors Corp. led all other companies in dollar value of contracts with 49 contracts valued at over $138 million. Republic Aviation Corp. was second with 10 contracts valued at $97.9 million, while Bendix Aviation Corp. had the largest number of contracts, 107, totaling more than $42 million.

The new publication lists contract-winning companies in alphabetical order. It takes its lists from the contracts announced through the Office of Small Business, Department of Commerce. It is planned to issue a new supplement every three months, and a completely new edition each year. Available for $7.50 from U. S. Bid Information, 3603 R St., NW., Washington 7, D. C., or free to subscribers of the daily bid information service.

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AVIATION WEEK—FEBRUARY 12, 1951

Aerotec Corporation, The 34
Agency—Hening & Co., Inc.

Airborne Accessories Corp. 8
Agency—Gray & Rogers Adv.

Allison Division, G.M.C...27, 37, 43, 4th Cover
Agency—Kudner Agency, Inc.

Aviation Accessories, Inc. 7
Agency—Kimball Adv. Agency

Beech Aircraft Corp. 5
Agency—Erwin, Wasey & Co., Inc.

Chicago Metal Hose Corp. 20
Agency—Russell T. Gray, Inc.

Cities Service Oil Co. 19
Agency—Ellington & Co., Inc.

Collins Radio Company.....Third Cover
Agency—W. D. Lyon Co., Inc.

Darnell Corporation, Ltd. 26
Agency—Rhea Advertising Service

Eastman Kodak Company 23
Agency—J. Walter Thompson Co.

Flexible Tubing Corp. 29
Agency—McNevin-Wilson-Dalldorf, Inc.

Flight Research Engineering Corp..... 33

General Electric Company..... 10
Agency—G. M. Basford Co.

Goodrich Co., The B. F..... 3
Agency—Batten, Barton, Durstine & Osborn, Inc.

Joy Manufacturing Co. .....Second Cover
Agency—Walker & Downing Adv.

Kidder Peabody & Co. 32
Agency—Doremus & Co.

Leach Relay Company 46
Agency—The McCarty Co.

Lewis Engineering Co., The 30

Marman Products Co., Inc. 25
Agency—West-Marquis, Inc.

McGraw-Hill Book Co., Inc. 53

Minneapolis-Honeywell Regulator Co.
Front Cover
Agency—Foote, Cone & Belding Adv.

Modern Dunnage Mfg. Co. 53

Piasecki Helicopter Corp. 53

Roebling's Sons Co., John A. 4
Agency—Beatty & Oliver, Inc.

Ryan Aeronautical Company..... 38
Agency—Batten, Barton, Durstine & Osborn, Inc.

Ryerson & Son, Inc., Joseph T..... 31
Agency—Aubrey, Moore & Wallace Adv.

Searchlight Section 47, 48, 49, 50, 51

Servomechanisms, Inc. 28
Agency—Sanger-Funnell, Inc.

Sprague Electric Co. 45
Agency—The Harry P. Bridge Co.

Standard Pressed Steel Co. 44
Agency—R. E. Lovekin Corp.

Tenney Engineering, Inc. 22
Agency—O. S. Tyson & Co., Inc.

Texas Company, The 6
Agency—Erwin, Wasey & Co., Inc.

United States Steel Supply Co. 46
Agency—Batten, Barton, Durstine & Osborn, Inc.

Wittek Manufacturing Company 42
Agency—The Advertising Corp.

PROFESSIONAL SERVICES—
First issue of each month

SEARCHLIGHT SECTION
(Classified Advertising)

EMPLOYMENT
Positions Vacant.....47-49
Employment Agency..... 48
PLANES—EQUIPMENT
(Used or Surplus New)
For Sale.....50-51
WANTED
Planes-Equipment 50

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By *Leslie E. Neville*
Curtiss Wright Corp., Former Editor, Aviation

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THIS book enables the aircraft engineer embarking on a new design problem to see clearly and as readily as possible precisely what has been done both here and abroad on the specific aircraft part he is designing. It presents amazingly clear three-dimensional drawings that show design details for a variety of aircraft, engines, and accessory equipment. First published in WINGS Magazine and AVIATION, these three-dimensional drawings were acclaimed enthusiastically by engineers who referred to them. Now they are available, together with scores of hitherto unpublished design details, in the *first book of its kind for aircraft designers.*

Includes design details for land planes and seaplanes of both metal and composite construction, grouped for easy reference in terms of power plants. Such military planes as the Messerschmitt ME163, the P-80, and the Republic Seabee are shown, and several German and Japanese designs are compared for efficiency and practicability.

"... enables aircraft designers and engineers to acquire quickly an appreciation and understanding of design as exemplified in aircraft and their power plants."
—AIR FORCE TIMES

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EDITORIAL

Is Patriotism for Kids?

The United Auto Workers of CIO were about to enter their sixth week striking against Fairchild Aircraft division as these words were written.

We hope the strikers' home town newspaper in Hagerstown, Md., has been publishing those war pictures we have seen of the Fairchild C-119 cargo plane at work in Korea. The struck plant is the sole source of these key aircraft.

Or has integrity of union leadership deteriorated so much —as we saw in the case of the Brotherhood of Railway Trainmen's shameful strike—that old-fashioned Americanism is now held to be naive stuff in this enlightened atomic age?

It is about time the United States Air Force or some other branch of the national government enters this ridiculous picture and tells the Fairchild strikers to go back to work while the negotiators for both labor and management try to work things out.

After Senator Taft's startling election victory in Ohio, the Administration in Washington should no longer have any illusions that in dealing with labor it must choose between losing votes or losing a war. Real Americans know very well where they themselves stand and a lot of them are conscientious laborers. When is this country going to rebel against union leadership that pulls strikes against the country?

A Public Servant First

The deft act of "saving face" in Washington sometimes seems to be rated a more vital necessity than it is in the Orient. Federal office holders frequently prefer it to serving the public conscientiously and honestly.

In Washington, many a new or worthwhile idea is rejected or pigeon-holed because it came from the "wrong" source or because it shows up a mistake in the same camp. Every newsman who has worked long in the national capital has seen so many examples of this type of public works that he sometimes yearns for a clear-cut example of forthrightness or willingness to right a wrong even at the expense of "face."

Last week's newspapers reported such a move by AF Secretary Finletter that we think is typical of his bigness.

The Continental Air Command at Mitchel Field had requested that Capt. Charles A. Hill, Jr., a colored Air Force reserve officer, resign his commission or seek a hearing on disloyalty charges. One of these charges was that he had been seen reading the Daily Worker, the U. S. Communist daily newspaper, and other charges accused his father and sister of having been involved in the past with groups of questionable loyalty. The registered letter to Capt. Hill was signed by Col. R. W. Hall, Assistant Director of the Air Command's military personnel, Hill told the N. Y. Times.

The suspect had been decorated three times for gallantry in World War II.

Secretary Finletter took over the case personally and in a matter of hours quashed the charges, ordered the investigation dropped, praised Capt. Hill's outstanding war record and expressed regret publicly that charges had been lodged against him.

After reading of such cases you have a new appreciation for the sagacity of our founding fathers in demanding that a civilian hold control of each uniformed military service. And you appreciate the kind of conscientious and able public servant who will accept a vitally important office in these days and dare to reverse one of his own officers and sacrifice "face" to justice and country.

Another Investigation

A military investigation is being made of the source of AVIATION WEEK's story Jan. 29 on a year-old proposal by the Douglas company for a four-engined turboprop swept-wing long-range bomber.

This information comes from the Associated Press in a story printed in newspapers Feb. 4. Our story and accompanying illustration from AVIATION WEEK were given conspicuous play in Los Angeles newspapers. According to the AP, the USAF Inspector General is looking into the matter as it looks into any apparent violations of security.

If the Inspector General sends an investigator to us we shall be glad to tell him exactly how a sheet of a Douglas-printed brochure fell into our hands. The tale will remind you of the story recently about the Washington newspaperman who picked up on the street a sheet of waste paper from NACA and found the contents worthy of printing.

Why Did Truman Say It?

What did President Truman mean in his address Dec. 15 when he referred to increasing aircraft production five-fold within the coming year?

The aircraft industry still debates this matter. Some keen and realistic observers like United Aircraft's President Jack Horner simply said such a jump just isn't in the cards. Another group allied themselves with the "we can do it" school, and a third, more cautious opinion was, "We can do it but only under perfect conditions," which means in this day and age that they can't do it!

We are finding, too, that even in the industry there is growing confusion as to what the President really said. This is what he said:

"Within one year we will be turning out planes at five times the present rate of production. . . ."

AVIATION WEEK sent out queries to both the Pentagon and the White House to learn whether the President meant to say what he did say.

High Air Force people answered us like this: "(1) Production rates are classified. (2) Even if we were in position to comment, we would still not be in position to interpret the President's message, or—of course—to contradict it."

Our efforts in the White House wound up with a message from one of the President's inner-circle of speech writers. This spokesman, after checking for us, said in effect:

"The national emergency speech was read carefully in advance, cleared and approved by the Air Force and by Secretary Marshall himself, as well as others. So far as the White House is concerned, the statement about a five-fold increase in production is clear and concise and meant what it said. How does the doubter know what Defense Department plans to have on the books by the end of 1951?"

Obviously, then, the President meant what he said. The wording was not a typographical error. But it seems obvious to us, too, that the spokesman himself even did not realize that the "doubters" were those who contend that the production rate cannot be increased in 12 months to five times the present rate, no matter how many orders might be on the industry's books.

We hope that industry meets the President's unrealistic goal, but we go along with men like Horner who have been proven right before. Somewhere along the line the President was poorly advised. This we put on the record now before the Administration starts lambasting the industry with brickbats next December.

—Robert H. Wood